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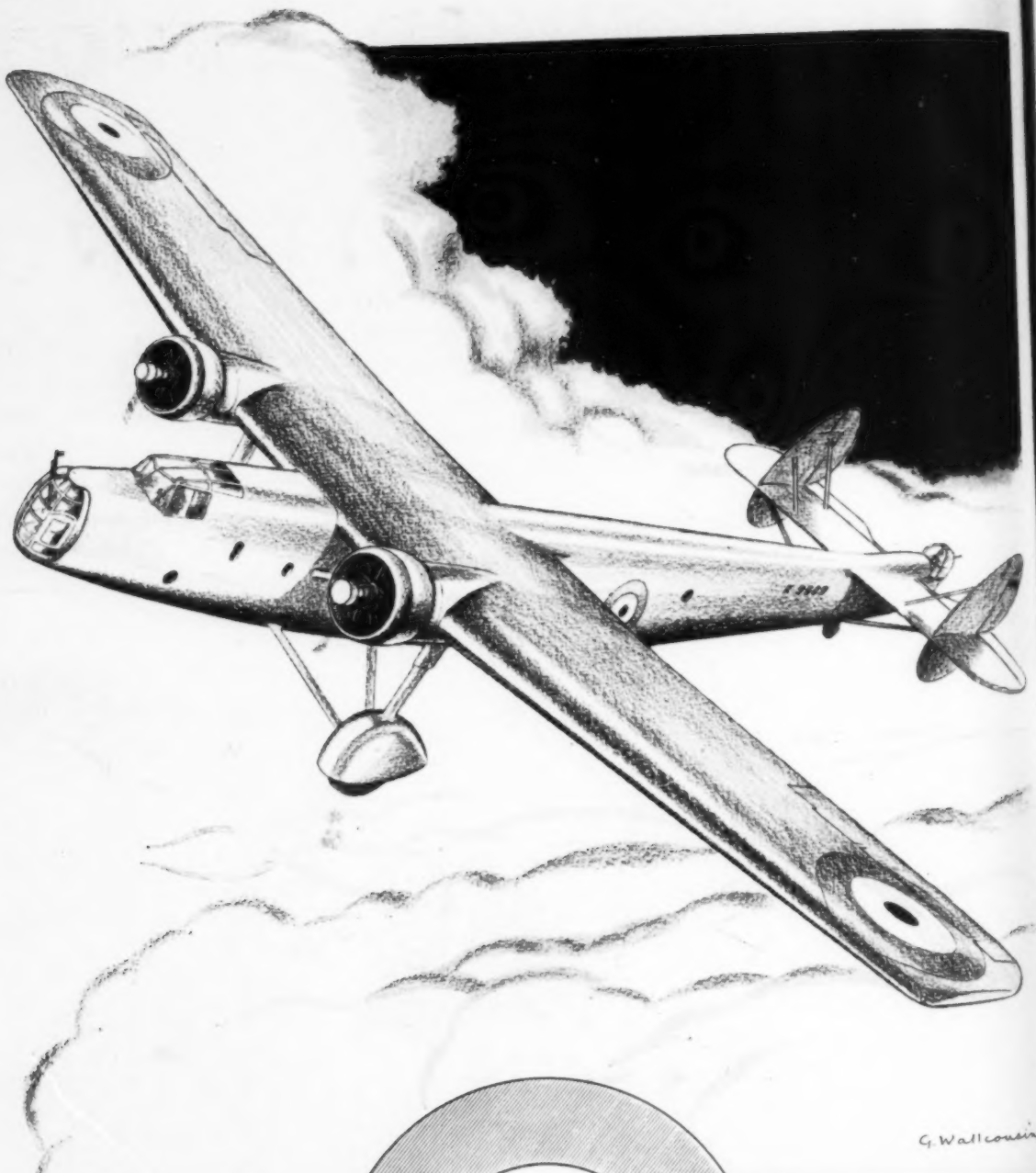

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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A Question of Traffic

ANYONE who compares the programme of Railway Air Services for the coming summer (may it come soon!) with the scheme drawn up by the Maybury Committee will surely be struck by the way in which Railway Air Services avoid a direct connection between London and Glasgow. All their lines to the commercial centre of Scotland go via the Isle of Man or Belfast. When questioned by *Flight*, an official of R.A.S. said that they did not see any good prospect of direct traffic between London and Glasgow or between Manchester and Glasgow.

It will be remembered that the Maybury Committee's scheme of air routes placed a junction at either Manchester or Liverpool and a northern terminus at either Glasgow or Edinburgh. Therefore it must be assumed that the Maybury Committee saw an undoubted prospect of traffic from London, or at least from Lancashire, direct to Glasgow. The Committee was able to consult and study traffic returns of all sorts, and its conclusions were only reached after careful study of many data. Its recommendations are not to be lightly dismissed. On the other hand, the practical experience of Railway Air Services is bound to be treated with respect. The two doctors seem to disagree in their diagnoses and prescriptions, and what, we ask, is the poor patient to think?

It has been said, and perhaps is still being said in some quarters, that Railway Air Services will never give a straight deal to air transport, as the chief object of four of the five shareholding companies is to make profit out of rail transport. The latter statement may be true, but even so it does not justify the former assertion. R.A.S. certainly do not want to lose money on air transport, and the progressive nature of the programmes published both this year and last year decisively negatives any charges of wanting to stifle air transport in the interests of the railways. We may take it that when R.A.S. consider a certain route more suitable for rail operation than for air operation they speak with a great deal of knowledge and experience behind them. It is only common sense to admit that when the time saved by flying a certain route is only slight, passengers will rarely care to pay the higher fares; in which case it would only be a waste of money, effort, and (which is very important) the credit of air transport to start a line which was doomed to fail.

Continental Connections

Connections with services to the Continent are another factor which has to be considered when planning air routes, and Railway Air Services have considered them. They have pointed out in a statement that Belfast men can leave their home city at 9 a.m., reach Paris at 2.45 p.m., Amsterdam at 3, Cologne at 4.15, and Geneva at 7.45. But a Glasgow man cannot do likewise, so far as the services of R.A.S. are concerned, and one wonders why there should be so much more desire for foreign travel in Belfast than there seems to be in Glasgow. From this point of view, the Maybury Committee appears to be looking farther ahead than R.A.S. are doing.

Everyone is always being admonished to look far ahead when planning for air transport, but naturally remote dreams may or may not materialise. Belfast is in favour with R.A.S. because it is on the far side of the Irish Sea, and the company is (as the Irish themselves might say) on firm ground when flying across the water. Then the surface transport can easily be beaten, and fares are certain. That is very well for the present, but takes no count of the future. Only future experience can prove which of the two theories outlined above is the right one, and it will be extremely interesting to watch the problem being solved.

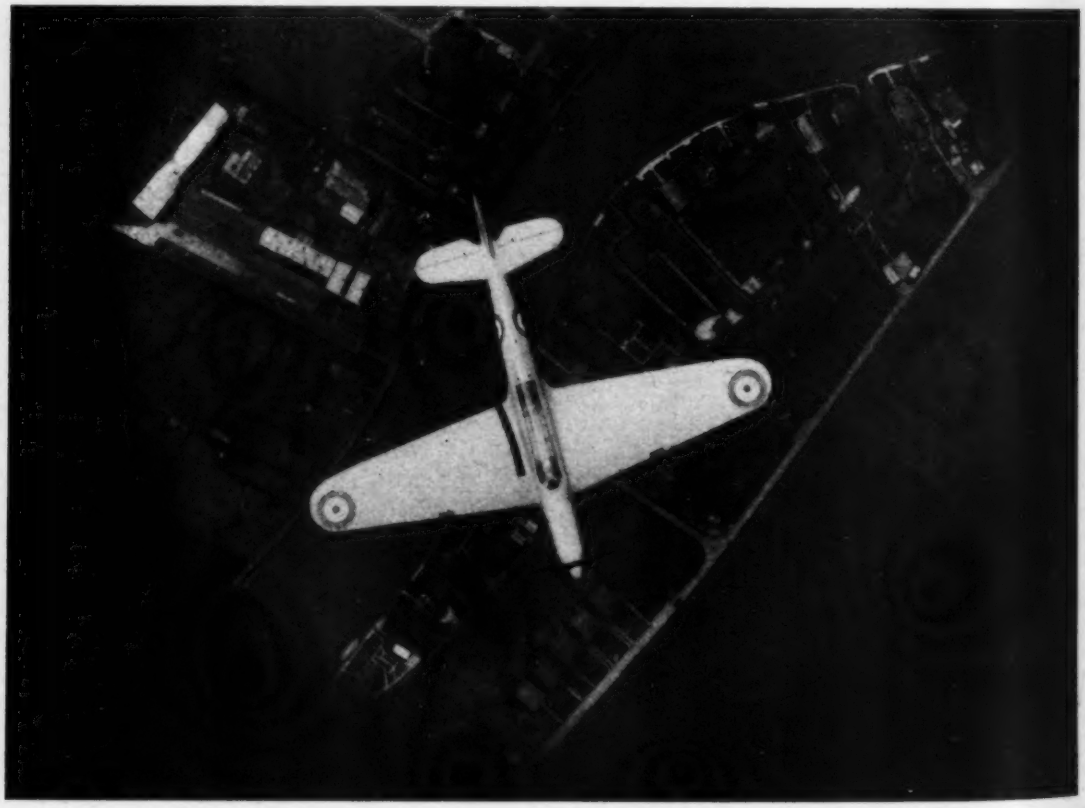
Girdling the Earth

THE plans of Imperial Airways and the other companies which are working with them almost oppress one with their magnitude. The world seems such a very big place and man such a very small creature—what impudence it is for that pigmy to treat the great world in such cavalier fashion, to run a belt of air transport round its girth, to turn Puck's fantasy of girdling the earth in twenty minutes into something very like sober and prosaic fact! Let the framers of schedules split hairs if they will, and tell us that for some quite considerable time to come it will take a good deal more than twenty minutes to fly round the world! The bewitching dream of Shakespeare's Midsummer Night is, for all that, in essence coming true.

In the last week news has come in from all parts of the earth telling of plans taking shape for completing the circuit, and, what is more, for giving the girdle an all-red hue. Australia having agreed to Great Britain's suggestion of a flying-boat route to Sydney, now Great Britain, Australia and New Zealand have also agreed in principle to starting a trans-Tasman service on to Auckland. The girdle, however, is not to stop there. The next step, it is now avowed, is to fly on from Auckland to Vancouver. Since Kingsford-Smith in his *Southern Cross* conquered the Pacific at the first attempt, this ocean has offered no technical obstacles to air transport. Since then Pan American Airways have started a commercial service across that great ocean from San Francisco to Manila, which may have a branch line to New Zealand. The British line will not stop at San Francisco, but will continue to Vancouver.

New Zealand and Canada—one often sees the names connected when lists of the British Dominions are published, but one has never thought of any intimate connection between those two particular Dominions. In space, and, perhaps, in sentiment, they appear farther apart than are any other two Dominions of the British Empire. But the flying boat will draw them close together. Meanwhile Canada is making ready her own air line across the continent from Vancouver to Montreal, and so we approach from a new angle our old tough problem of the transatlantic air route.

Here Canada, Newfoundland, the United Kingdom and the Irish Free State compose the chorus, with Pan American Airways joining in. The Midsummer Night's Dream has now come to close grips with technical and commercial problems, and we cannot trust the whole matter to the hands of Puck. The sprite must co-operate with Mr. Gouge, Col. Lindbergh and others. We will leave them to it, and turn our faces to the South. Here agreement has been reached between British and American interests that either New York or Montreal may be used as the terminus of transatlantic services. The flights betwen Bermuda and New York will doubtless soon begin. Now Portugal enters upon the stage, and she is stated to have signed an agreement allowing Imperial Airways and Pan American Airways to make use of the Azores. So round the world will go the British flying boats.



PEEPING ON A "P.4": The camera hole of a Swordfish and the accommodating piloting of Flt. Lt. Christopher Staniland offered *Flight's* photographer this irresistible "shot" of the Fairey P.4/32 high-speed light bomber now undergoing contractor's trials at Heath Row.

The Outlook

A Running Commentary on Air Topics

Ancient—

WHETHER one likes it or not, the English language is gradually being enriched (some would use a different adjective) by the introduction of some of those very descriptive American expressions which dismiss a whole sentence in a word or two. Purists may lament the fact, but there is no stemming the tide; the words come into use, are gradually accepted, and finally are scarcely recognised as foreign to the language. Like most other things, a language must grow and develop; otherwise it must decay.

In the early days of flying the English language adopted many French expressions and names, many of which are still in use. The reason was a very natural and obvious one: a great deal of the earliest flying in England was done on French machines; most likely the pilot had been taught to fly in France, and there picked up the French names for the various components of the machine. When asked what these were called he might think of an apt English name, but would be much more likely to use the French. In that way reached us such words as fuselage, nacelle, and aileron. We could just as well have used body, boat, and winglet, but at the time they sounded rather silly, and the French names may have had the attraction which often accompanies the sound of a foreign word imperfectly understood.

When this journal was founded in 1909 a great many titles were suggested for it, but ultimately the then Editor and proprietor, Mr. Stanley Spooner, turned all of them down and decided in favour of *Flight*, a perfectly good English word which covered the subject. This shows that we were, from the earliest days, in favour of using English words in preference to foreign if they were equally descriptive. We adopted from the beginning the word "aeroplane" because at the time there appeared to be no English word as descriptive, "flying machine" being rather cumbersome, and "flier" being ambiguous.

—and Modern

LAST week the Royal Aeronautical Society threw something of a bombshell into the aviation world by using in an Official Notice—a lecture announcement—the word "airplane." It is difficult to see any justification for this. "Aeroplane" has become accepted by this country, with the exception of a group of newspapers, and at any rate one would not have expected the suggestion to come from a body of the august ancientness of the R.Ae.S. (founded in 1866).

"Airplane" is no more descriptive than "aeroplane," so there is little excuse for making the change. If it is the "aero" part of the word to which the R.Ae.S. objects, as obviously it must be, then it is difficult to see how the Society can escape the duty of carrying out the objection logically throughout. We may, then, receive an invitation from the Royal Airnautical Society (with which is incorporated the Institution of Airnautical Engineers) to a Garden Party at Fairey's airdrome, at which all the latest airplanes and air engines will be demonstrated. Doubtless many of the eminent airdynamic experts of the Airnautical Research Committee will be present, as well as representatives of the Directorates of Airnautical Inspection and Airnautical Production. Perhaps the secretary of the Royal Air Club will be invited, too.

National or Local?

PRECAUTIONS against damage by air raids are a form of insurance, but in the present case the premia appear to be very high. Of course, it is much better business to pay a high premium than to suffer grievous damage from an air bomb; but the risks are not imminent. Bombing of cities which contain military objectives there will certainly be in any future war, and it is equally certain that some of the bombs will miss those objectives and will damage private property.

Very elaborate plans have been drawn up, but local authorities are pausing before putting them into practice until the Government declares what proportion of the cost it will shoulder. In equity, all such charges ought to be borne by the central Government, and the money should come out of the taxes rather than out of the rates.

There is much in common between taking precautions in good time and compensating for damage after it has occurred. In 1915 *Flight* waged a long and persistent campaign in favour of national insurance against air raid damage, and ultimately the Government started a national insurance scheme which worked very satisfactorily. The same principle ought to be applied now. We should hesitate to urge that the Government ought to bear the whole cost of air raid precautions everywhere, and the local authorities have not suggested a thing. But the Government contribution ought to be generous.

"Expansion" Trainers

OF all the blessings conferred on the R.A.F. none has been more vital than the uncompromising efficiency of its training machines. Perhaps "uncompromising" is misleading, for the good primary trainer is, of necessity, a compromise, a paragon of intermediacy, neither too difficult nor too simple to fly, never concealing errors of handling, but impervious to everyday abuse.

Hitherto our trainers have borne an almost monumental significance. Bombers and fighters passed by, but the Avro 504, periodically rejuvenated, continued as the trial horse for the young idea. Until a few years ago *ab initio* on a "504" was regarded as the birthright of every Service pilot. Masters of Camel and Gauntlet alike cut their teeth on this most beloved of all aeroplanes.

"Intermediate" types, and by that is meant machines reproducing the handling characteristics of first-line Service aircraft, have, in post-war years, been conversions from standard types, and no great study of this class has been necessary. The advent of the monoplane régime, however, focuses fresh attention on training equipment.

The position in the R.A.F. to-day is that we have the Tutor, supplemented for special duties by the Prefect and Tiger Moth and, in the more advanced categories, by such types as the Hart Trainer and the single-seater Fury and Gauntlet. Under the Expansion Scheme the Air Ministry has placed orders for Miles Magisters, De Havilland Dons and Airspeed Oxfords.

The Magister is an improved Hawk Trainer, and, as such, its qualities are well established. The Don is an entirely new design, while the Oxford, for twin-engine training, is descended directly from the well-tried Envoy.

In this trio, each machine of which is designed to cover a specified range of duties, we shall undoubtedly have training equipment fit for the preparation of crews for the superlative front-line machines now being delivered.

DIARY OF FORTHCOMING EVENTS—PAGE 343

ITALY'S MARTLESHAM

Montecelio Aerodrome : Some Famous Italian Aircraft : The Caproni Works

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C., A.F.R.Ae.S., F.R.S.A.

ALONGSIDE the air laboratory of Guidonia is the aerodrome of Montecelio, which might be called the Martlesham Heath of Italy. Lieut.-General Ferrari gave me permission to visit it.

I knew already how efficient the new Italian aircraft were. Indeed, everyone in aviation knew (or ought to have known) that in September, 1935, the three-engined Savoia 79 took eight world's records from Germany and the United States.

Then there is the Cantieri Z.506 seaplane which also took eight world's records. It carried two tons of load at a speed of 194.45 m.p.h. for 621 miles and at a speed of 189.94 m.p.h. for double the distance. With 2,100 h.p. this floatplane has a top speed of 226 m.p.h. at 11,480 feet.

Three Caproni types seen by the author at Montecelio. Above is the 111, usually fitted with an 830/970 h.p. eighteen-cylinder Isotta-Fraschini water-cooled engine. In the centre is the 133 (three 430 h.p. Piaggio radials), a type widely used in the Abyssinian campaign. On the right is the new 135 bomber, seen by Capt. Macmillan in series production at the Caproni works. It can carry a ton of bombs 2,000 miles at 267 m.p.h.

Knowing the high performances of Italian aircraft (guaranteed by the gaining of international records) and being aware of the performances claimed for others, I had not been surprised to find that Guidonia (which I described in *Flight* of March 25) was a super-laboratory of the air. And, naturally, I was interested to see what Montecelio aerodrome had to display.

A *Super Runway*

With Captain Antonio Eula, of the Aerodynamic Department (who had piloted me round the laboratory and who spoke excellent English), and the official who had accompanied me from Rome, I motored round to the aerodrome. On the way we crossed the Montecelio concrete runway, the starting-point of record-breaking flights. Beginning outside the boundary of the aerodrome proper, near the airscrew test hangar in the station of Guidonia, it slopes downwards in a gentle gradient, steep enough to give good initial acceleration. On the aerodrome it levels out. Its opposite end lay out of sight on the far side of the aerodrome.

Near the runway end of the big aerodrome are hangars for regular squadrons and workshops of the Regia Aeronautica. This part of the aerodrome I did not visit. We drove past it to the experimental section at the other end. There a large number of aircraft of assorted types were outside the hangars; within were many more.

First we reported to the duty officer; then walked round the hangars and inspected the machines inside; afterwards we looked at the several types upon the aerodrome.

Among the machines I saw were the Breda 75, Piaggio 32, Caproni 135, 133 and 111, the Fiat C.R.32, the Ro.42, the A.P.1, and the Savoia 81 and 79. Many of these aircraft are as good as anything else in their class in the world. The pick of the lot were the Breda, Piaggio, Caproni 135 and the Savoia 79.

The Breda 75 is a shoulder-high, all-metal monoplane two-seater; fitted with an air-cooled radial engine, and designed for reconnaissance work, it gave one the impression that it was approximately in the same class as the Westland Lysander.

The Piaggo 32 is a low-wing monoplane with two air-cooled radials and retractable undercarriage, equipped as a medium bomber. It has unusual flap and aileron gear; the flaps are divided spanwise into two portions fore and aft; when the flaps are used the outer portion lowers to a greater angle than the inner portion, thus giving a truer curvature form than is obtainable with the ordinary single flap; the extreme outer portion of what one might call the secondary flap is used as an aileron.

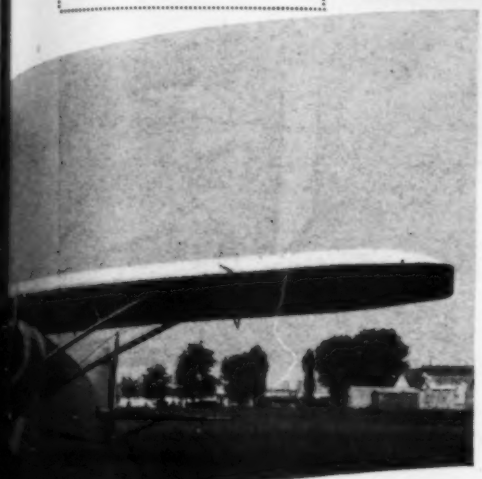
I was informed that this flap gear is extremely efficient and has proved fully equal to the expectations of its designers. Even with very high wing loading it is said to give extremely low landing speeds.

In the same hangar was the Caproni 135, another twin-engine, retractable-undercarriage, low-wing medium bomber. Its bomb load is 2,200 lb., range 2,000 miles, ceiling 28,900 ft. and top speed 267 m.p.h. It looked a very clean, workmanlike aircraft, in line with the best modern all-metal aircraft of its class in any country in the world.

The Caproni 133 was the standard type of reconnaissance and bombing aircraft used in the Abyssinian campaign, where it worked extremely well. Of older design and much slower speed, it is able to give a good account of itself under colonial conditions.

The Ro.42 is a little single-seat fighter, designed for interceptor work, with an engine of about 320 h.p. and a high gull wing. I was told it had a very fast climb, and that, although the forward speed was slow, as one would expect from its low horse-power, it was very manœuvrable

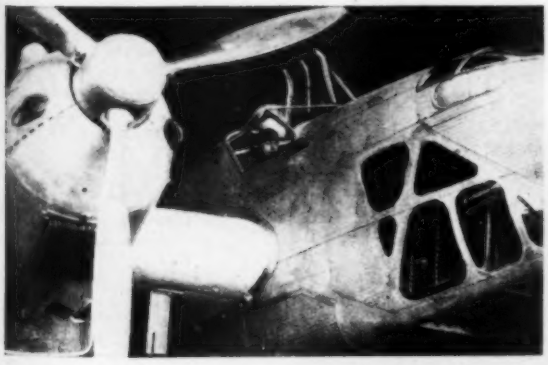
IN SEARCH OF GERMAN AND ITALIAN AVIATION PART VII



and excellent when diving. One would describe it, I suppose, as a local interceptor.

The Fiat C.R.32 is a standard single-seat fighter of a design which has served Italian squadrons for some considerable time.

The A.P.1 is called an attack aircraft. A single-seat, low-wing monoplane fighter, with



non-retractable undercarriage, it is equipped with machine guns fitted in the wings and firing outside the airscrew disc. These guns can be moved through a small elevation so that they can be pointed downwards for ground strafing or levelled for aerial fighting.

The Savoia 79 was on the aerodrome in considerable numbers. I have already made reference to its efficiency, and it looks a good job. On its record-breaking flight it carried a load of two tons round 1,240 miles of a circular course at a speed of 236 m.p.h.

In Great Britain there seems to have prevailed a belief that the S.79 was a commercial aircraft. So it was, that first one that took those records, but every other one is military, and there are lots of them—at least four squadrons. I saw plenty at Montecelio.

This seems to be the right method to develop certain classes of military aircraft quickly. Build the first one as a civil type and test its characteristics rapidly as a simple commercial aircraft. It is (or ought to be) easy enough to add armament to the later versions. Meantime, all the really important faults are found and can be rectified.

Italy seems to use this method. In Germany both the Junkers 86 and Heinkel 111 are dual-purpose civil and military types. The Ju.52 was developed as a bomber from the civil version.

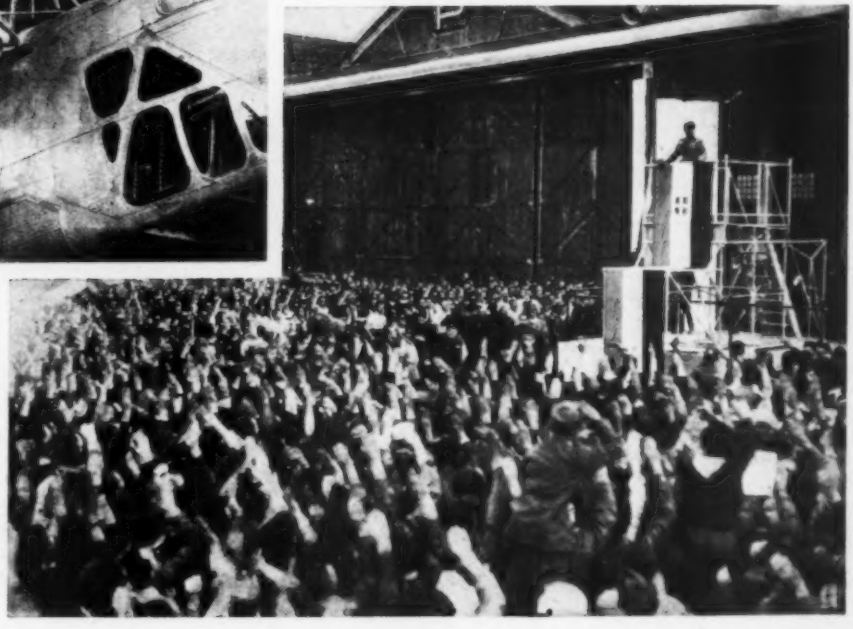
In Britain the Bristol Blenheim was evolved from the *Britain First*. Without the latter as a prototype the Blenheim could not have been produced so quickly.

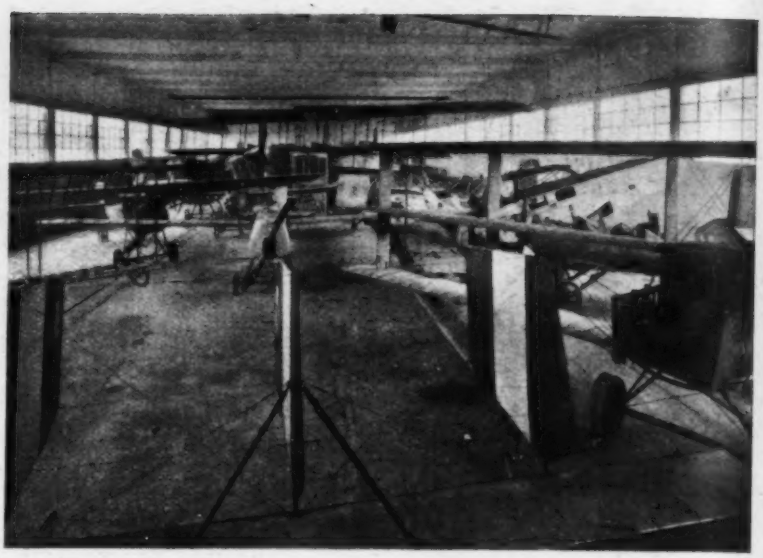
As a civil aircraft can fly without let or hindrance a civil prototype could, if need be, make an Empire flight and test the suitability of the type for subsequent use throughout the territory for which our designers have to build. I am sure new types of heavy bombers would be more quickly proven if they first took the air as purely civil types.

* * *

I should have liked to see the S.79b, the twin-engined

Il Duce Mussolini, who is a qualified pilot, in the cockpit of a Caproni 135 during a visit to the Caproni works. Below he is seen addressing the workers.





In the Caproni works museum. In the background is one of the big triplane bombers of the Great War, and a smaller triplane is seen on the right.

bomber version of the S.79, and also the twin-bomber Fiat B.R.20. But there were no specimens of either type at Montecelio. I saw, however, sufficient types to show that the practical aerodynamics of Ialian aviaton is of first-class order.

* * *

The Ministero dell' Aeronautica made arrangements for me to visit the Caproni factory on my way back to London. I have already noted that there was no direct passenger air service between Rome and London. There was nothing to be gained (in fact, time would have been lost) by flying from Rome to Milan. So I spent an uncomfortable night in a railway sleeper. Not that the sleeping coach was uncomfortable. It was as good as any of them ever are. But I hate travelling by train and I loathe sleepers. I am always conscious that I am travelling when I sleep in a train.

It was a misty morning when the train pulled into Milan Station, but after I had bathed, shaved and breakfasted the sun began to strike through the mist. I took a taxi to the works on the outskirts of the city.

Unfortunately, I did not have the pleasure of meeting Signor Caproni himself, for he had gone abroad that morning.

I was accompanied through the administration offices and the drawing offices by an official of the company. Of considerable size, they lie on either side of a long corridor.

Thence we passed out into the open. The next building we entered was the machine shop. There metal parts were being made for the current aircraft in production. As one machine shop looks very much like another, and there was no particular detail in which I was specially interested, we passed through this section of the Caproni factory quickly.

Thereafter we visited the many different departments in the works. I will not detail each one, but dwell mainly on general impressions. In the stock room for materials ample stores were available to meet any emergency that might arise in the speeding-up of production. In the erection shop, a large building free from obstructions, three types of aircraft were in the preliminary stages of assembly. Among them were some forty fuselages of a two-seater reconnaissance aircraft—a metal type, fabric-covered, fitted with a 650 h.p. liquid-cooled, twelve-cylinder Fiat engine. The crew of two are housed within an enclosed cockpit, very similar to that on the Fairey Battle. The undercarriage is fixed, for the single-bay biplane construction does not readily offer opportunity for retraction. A thoroughly workmanlike standard aircraft, it is, I believe, being built in series in a large number of factories. I should say that performance, while not outstanding, is of sufficient merit to meet the requirements of all ordinary general reconnaissance work. It should make a very useful type of aircraft for co-operation with Italy's large army. The fuselage is built up of welded steel tubing, and seems a neat job.

Two famous Italian record-breakers. On the right is the Macchi-Castoldi 72 (3,000 h.p. 24-cylinder Fiat), which still holds the world's air speed record of 440.677 m.p.h., made in 1934. The other machine is the Cantieri Z. 506 (three 700 h.p. Fiat nine-cylinder radials), which holds several records for speed with load.

In the same hangar a number of Caproni 133s were in the final stages of assembly. This aircraft proved so successful in the Abyssinian campaign that it has been adopted as the standard colonial type for the development work now going on in that country. It has been converted from a bomber into a general transport aircraft, suitable for the carriage of mails, general and military cargo or troops. In place of bomb racks, additional fuel tanks have been fitted to increase the rather short range which the machine formerly possessed. It should make an excellent aircraft for the purpose. The wings are built of wood, with large box spars and wood ribs. All steel parts are cadmium treated against corrosion. I believe the corrosion resistance of the aircraft was of great importance during the Abyssinian campaign, in which many of the machines used were said to have suffered from corrosion; the Caproni 133 gave no trouble of that kind. This makes one wonder whether our new Dural-built, stressed-skin jobs will stand up to colonial conditions, say, at Aden. It might be a good plan to send some early specimens overseas for extensive trials before production has gone too far.

The Tin-Bashers

Thence we passed on to the panel-beaters' shop, where sheet-metal workers were engaged in their time-honoured occupations of hammering metal into the shape required. Next door, in a metal-airscrew shop, blades were being fashioned by hand from forgings slotted by expert fitters at certain stations on the blade to give the correct profile, after which the remaining metal between the stations was removed by less skilled hands. The shop included a standard type of airscrew balancing machine.

The annealing and normalising room is of considerable size, as is the department where the steel tubes used in Caproni construction are drawn (from the heavier gauge tubes supplied by the original tube manufacturers to the thinner section required for aircraft construction). Here a very neat type of Dural spar was also being made. It begins as a hollow rectangular section. On the major sides a template is clamped to enable an operator with a cutting tool to remove any triangulated sections. When the tube is thus lightened internal webs are riveted to the remaining structure, thus making an extremely strong yet light spar of large size.

In one of the oldest sheds of the factory is housed the museum. There aircraft representing almost the complete Caproni range are staged. Among them is Caproni's first pre-war aeroplane, and others so flimsy-looking that one marvels that they are still in existence. There are numerous examples of Caproni aircraft built during the Great War, including a large model of the famous triplane bomber and a number of post-war designs, ranging up to really modern transport aircraft.

Attached to the walls are panels illustrating the raids made by Caproni-equipped squadrons during the Great War. No greater evidence of the effectiveness and efficiency of Caproni aircraft is required than these graphic illustrations of their work under conditions of European warfare.

From the exhibition we crossed to some of the hangars where aircraft were being finished ready for flight tests. Wings for the 133 were being covered with fabric, doped and passed to the final assembly shop. In the final inspection hangars were large numbers of Caproni 133s.

The large experimental shop was pointed out to me, but, needless to say, its doors remained closed, for in no factory is the unofficial visitor permitted to inspect the experimental department. In another shop near it, however, I saw parts of aircraft, wings and fuselages undergoing static tests.

Out on the aerodrome, in the haze of the morning, were seven reconnaissance aircraft and one Caproni 133, finished in the cream colour of Italian colonial aircraft, awaiting tests. Presently the engines of the 133 started and it took off on its first flight test.

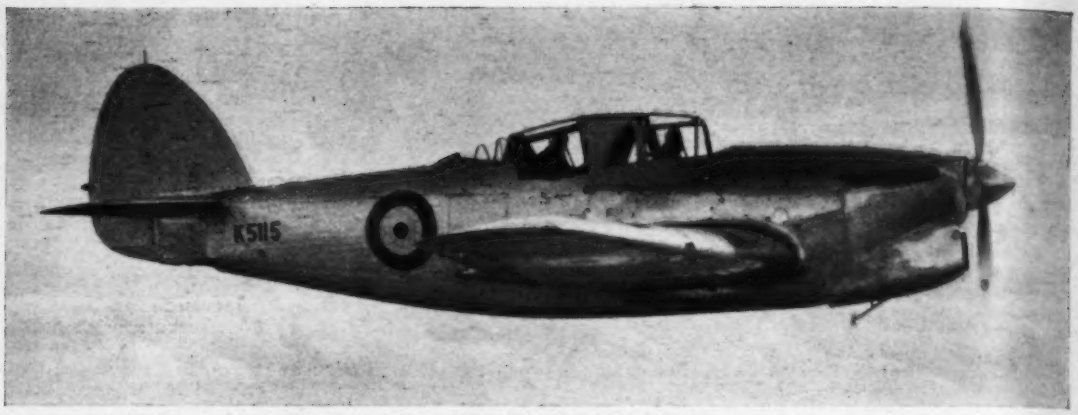
Such were the impressions of my brief visit to the Caproni factory in Milan. It is a progressive organisation whose interests extend to a new factory in Peru, where they have secured a contract with the Peruvian Government for the manufacure and repair of all types of aircraft, and to China, where they have an office some twenty miles from Shanghai for the negotiation of their not inconsiderable business with that Far Eastern nation.

[*The previous articles in this series have appeared in "Flight" as follows: February 11, 18 and 25; March 4, 11 and 25.*]

Forthcoming Events

April 8. R.Ae.S. Lecture*: "Control Problems," by Mr. A. G. Pugsley.
April 10. Aero Golfing Society: Martlesham Match.
April 15. R.Ae.S. (Coventry Branch) Lecture: "Production and Inspection Methods Applied to Screw Threads," by S. J. Harley. Armstrong Siddeley Canteen, 8.15 p.m.
April 15. Italian Aero Club: Sahara Rally.
April 20. R.Ae.S. Students' Section Lecture: "Design from a Pilot's Point of View," by Capt. J. H. Cordes. R.Ae.S. Library, 7 p.m.
April 22. R.Ae.S. Lecture*: "Power Plant Trends," by Mr. G. J. Mead.
May 6. Aero Golfing Society: Instone Trophy.
May 9. R.Ae.S. Garden Party, Great West Aerodrome, Hayes.
May 12-19. Austrian Aero Club: Austrian Whitsun Flight.
May 13. Leicester Airport Coronation Air Display.
May 15. Cardiff Aero Club: Coronation Rally.
May 15-18. Yorkshire Gliding Club: Whitsun Meeting, Sutton Bank.
May 26—June 6. Brussels Aero Show.
May 26-30. Austrian Aero Club: Salsburg Gliding Contest.
May 27. R.Ae.S. Wilbur Wright Lecture: "Turbulence," by Dr. Theodor von Karman. Science Museum, South Kensington.
May 29. Empire Air Day.
May 29-31. London-Isle of Man Race and Round-the-Island Contests.
June 4-6. York and Leeming Clubs: International Meeting, York.
June 11-14. Hungarian Aero Club: International Conference.
June 12. Bristol and Wessex Aeroplane Club: Garden Party, Whitchurch.
June 15-20. Magyar Pilota Picnic, Hungary.
June 20. R.Ae.C. of Belgium: Gordon Bennett Balloon Race, Brussels.
June 21-28. Federation Aeronautique Internationale: London Conference.
June 26. Royal Air Force Display, Hendon.
June 28. S.B.A.C. Display, Hatfield.
July 1. Aero Golfing Society: *Flight* Trophy.
July 3. Newcastle-on-Tyne Aero Club: London-Newcastle Race.
July 3. Ramsgate Airport, Official Opening.
July 4-18. Aero Club of Germany: Wasserkuppe Gliding Meeting.
July 10. Cardiff Aeroplane Club: London-Cardiff Race.
July 11. Italian Aero Club: Circuit of Rome.
July 15. Aero Golfing Society: Jubilee Cup.
July 17. Portsmouth Aero Club: Garden Party.
July 23—August 1. Swiss International Meeting.
July 24. Devon Air Day and Race: Plymouth and Exeter.
July 31. Cinque Ports Flying Club: Folkestone Aero Trophy Race.
July 31—August 2. Yorkshire Gliding Club: Opening Meeting, Sutton Bank.
August 1-14. Yorkshire Gliding Club: Instructional Camp, Sutton Bank.
August 1-31. New York—Paris Air Race Flights.
August 3-September 7. Public Schools Aviation Camp, Norwich.
August 6-7. Austrian Aero Club: International Rally, Lake Worth.
August 14-22. Yorkshire Gliding Club: Open Contest, Sutton Bank.
August 21. Thanet Aero Club: Aviation Meeting and Race.
August 21. Midland Aero Club: "At Home."
August 22-29. Italian Aero Club: Circuit of Littorio.
August 28 and 29. Cinque Ports Flying Club: Lympne International Rally and Wakefield Trophy Race.
September 10-11. R.Ae.C.: King's Cup Race.
September 12. Aero Club de France: Coupe Deutsch de la Meurthe, Etampes.
September 23. Aero Golfing Society: Cellon Trophy.

* These lectures take place in the Royal Society of Arts, 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.



HASTY HAWKER: The data obtained on initial test flights by the Hawker pilots are secret, but observers at Brooklands are not finding it necessary to line up the new Hawker "P.4" light bomber between two points in order to detect movement. This *Flight* photograph shows how the Hawker technicians have strived to suppress parasitic excrescences.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

THAT POSER FROM RHODESIA

MR. PERREM'S carburettor problem in your issue of April 1 (p. 327) interests me. I think, however, that his theory is highly improbable for three reasons.

First, even if the exhaust stubs pointed directly forward (which is most unlikely) and the air pressure, by some mysterious means, got into the petrol line the full air pressure at 100 m.p.h. would not be sufficient to flood the carburettor. Secondly, even if it were sufficient, high spasmodic pressures in the induction system could not make the carburettor flood, because all air which could be compressed in the petrol line could not get beyond the petrol pump. The petrol pump would, therefore, cease to pump any further petrol, owing to the high pressure on the delivery side, and if the carburettor did flood it could only flood "air," as the air must make its exit where it made its entrance, at the control needle. Thirdly, when the air has its one chance to get into the induction manifold, i.e., when the inlet valve is open, the piston is making enough room in the *cylinder* for all the air which could pass an open exhaust valve masked by a loose seat in the time at its disposal, and with the air at a pressure equal to 100 m.p.h.

I would be inclined to believe it possible that when the diaphragm tension spring was previously adjusted the diaphragm itself was leaking and the spring adjusted to bring the pressure correct. Later on, foreign matter in the petrol could temporarily seal the leak and bring the pump to its normal efficiency, which would, in turn, bring about the increased pressure.

One knows, however, that there are so many things which might be not quite right, so I put my suggestion as to the cause as more of a guess than anything else.

Peterborough. J. W. TOMKINS.

WITH reference to your Rhodesian correspondent's letter and the solution suggested, I would like first to criticise his solution and then to suggest an alternative.

He had a petrol pressure of 0.9 kg./sq. cm., or, in everyday English, about 13 lb./sq. in. To obtain such pressure in the manner he suggests would require a forward speed of over 750 m.p.h. and, secondly, if this were obtained it would effectively prevent any petrol from entering the carburettor. Thirdly, if the pressure could be maintained on the petrol it would effectively hold up the A.C. pump diaphragm, and petrol could not be pumped to the engine.

Now, to offer him an alternative solution, taking the two incidents separately: (1) No. 4 exhaust valve seat came loose, and (2) the the petrol pressure rose high enough to flood the carburettor. The normal solution to (1) is that the cylinder-head temperature was increased above normal—this is not an unknown failure from this cause. The normal cause of high temperature around the exhaust port is late burning due either to too rich or too weak a mixture. I suggest that the cause of this was excess petrol being taken in with the air, and not burned but expelled with the exhaust gases. Immediately this unburnt, hot petrol met the air it would burn and heat up the exhaust port.

There can only be one cause of high petrol pressure from this type of pump. Some means must have existed to compel the diaphragm to force the higher-pressure petrol through the carburettor. We are told that the diaphragm was found to be faulty; I suggest that this leaked, allowing petrol to pass into the air space above the diaphragm, and that the breather holes from this air space had become blocked. When the space became full it would act as a hard cushion to the diaphragm and force it to continue to follow the operating lever and so continue to pump petrol when, normally, the high petrol pressure would have held it off.

All possibility of this failure occurring can be prevented by keeping the breather holes clear. I believe the size of these has been increased from those on the original design.

Brough, E. Yorks. C. S. NAPIER.

THINKING ALOUD

AS one who, while not actively concerned with airline operation, does quite a lot of flying, both of the personally conducted and of the "airliner" variety, I feel constrained to put pen to paper and say how much I enjoyed "Charon's" outspoken article in *Flight* of March 25.

The majority of his criticisms are justified—though not everyone will agree on his cures—and it would be a good thing if every airline pilot could forget his loyalty to any particular firm and "think aloud." Air transport would run much more smoothly and safely if its regulations were evolved and its equipment specified by the people who actually do the job, rather than by the warmers of office seats. At present, it is often necessary for pilots and ground engineers to break the red tape deliberately in order that air transport shall fly.

Chelsea, S.W.3. UNCLE REMUS.

IN BRIEF

From a member of an Indian firm which apparently supplies, *inter alia*, "steam engines boilers, pumps and donkies pump etc.," comes a rather delightful request. We gladly comply with his wish with that we should "give the following lines in your paper without any charges":—

"The readers of *Flight* can ask about present past & future Free on sending full shape photo of card size, both hands impression, date of birth & time of impression with stamped address For reply. Apply to M. M. Vaid, c/o Vaid Bros Engs & Contrs Amritsar India."

Mr. Glen Ogilvie, B.Sc., A.F.R.Ae.S., of Imperial Airways, writes to say that he is being frequently asked whether he has any interest in a newly formed company, Ogilvie Aircraft, particulars of which were given in last week's *Flight*. In order to prevent any confusion he wishes it to be known that he is in no way connected with it.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

THE high-speed Japanese monoplane *Divine Wind*, which started a good-will flight to this country a few days ago, was forced by bad weather to return to Tokyo after having covered 1,500 miles.

The Anglo-American Oil Co., Ltd., have made a location one mile north-east of Hellingly, near Hailsham, Sussex, for their first test well in the search for oil in England.

An officer of the 33rd Pursuit Squadron, U.S. Army Air Corps, recently took a Consolidated PB-2A two-seater (presumably fitted with Curtiss Conqueror and exhaust-driven supercharger) up to 39,200 ft., where he remained for about twenty minutes.

Flying a Breda 88 twin-engined fighter-bomber, of which details are not available, Furio Niclot on April 1 established a new world's speed record over 100 km. His speed was 517,836 km./hr., which is about 321 m.p.h. The former record of 476,316 km./hr. was held by Maurice Arnoux in a Caudron. A batch of Breda 88s has been ordered for the Italian Air Force.

A new type of Beechcraft has lately been completed. A back-staggered biplane, it has a longer fuselage than current types and, fitted with one of the latest Pratt and Whitney Wasp Juniors (known, according to some reports, as the Bumble Bee), cruises at 235 m.p.h., although, thanks to flaps of a new electrically operated type, the landing speed is no more than 50 m.p.h.

LOW-DOWN TRICK: Count Hagenburg, who won the International Competition for inverted flying at Zurich in 1936, goes into training for this year's event, for which he is a hot favourite. His mount is a Bucker Jungmeister with 160 h.p. Siemens engine. The photograph is *not* a faked one.

Three Northrop Delta Mark I twin-float seaplanes are being built by Canadian Vickers, Ltd., for the Royal Canadian Air Force.

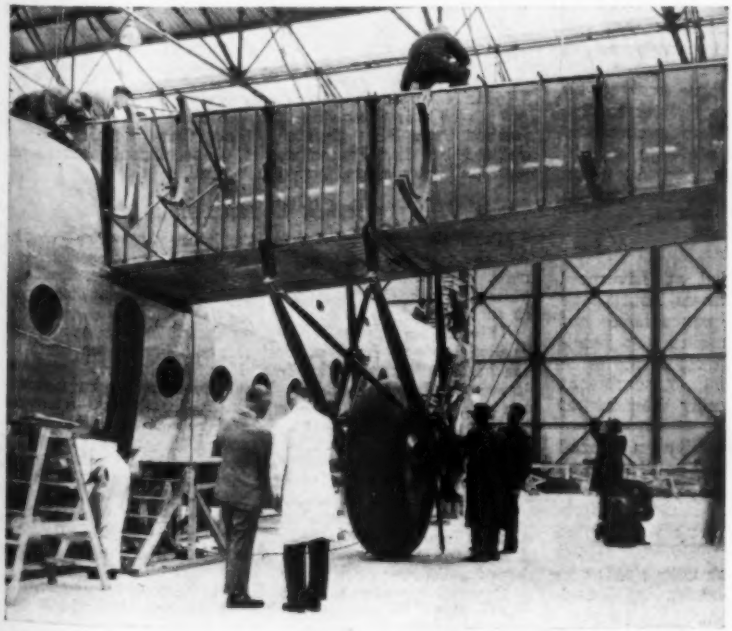
A number of test flights have been made with the twin-engined Fokker attack machine *Le Faucheur*, exhibited at the last Paris Show.

Lieutenant Bruno Mussolini, son of Il Duce, with Lt.-Col. Biseo as partner, will head a group of Italian aircraft entered for the New York-Paris race.

An airport and plant costing three million dollars, for the co-ordination of all the aeronautical operations of the Bendix Aviation Corporation, is to be established at Teterboro, New Jersey.

The next Associate Fellowship and Associate Membership examinations of the Royal Aeronautical Society will be held at 7, Albemarle St., London, W.1, on Wednesday, May 19, and Thursday, May 20.

The new R.A.F. stations at Driffield and Finningley (Yorks), Scampton (Lincs), and Upwood (Huntingdon), have been deleted from the list of R.A.F. stations to be open to the public on Empire Air Day, May 29. The station at Wyton (Hunts), however, has been added to the list.



FINDING ITS LEGS: The main spar and undercarriage are now in place on the first of the Armstrong Whitworth *Ensigns* for Imperial Airways. The undercarriage is the largest retractable type in the world and is of Armstrong Whitworth design and production, except for the Lockheed hydraulic rams.

Twenty-five Years Ago

(From "Flight" of April 13, 1912.)

"According to a report from Milan, the new monoplane built by the Caproni firm has proved very fast. Fitted with a 50 h.p. Anzani engine, and tested over a 5 kilom. course on the 28th ult., it covered 330 kiloms. in 3h. 5m. 30s."

COMMERCIAL AVIATION

— AIRLINES —— AIRPORTS —

THE WEEK AT CROYDON

Summer Time-Tables : Real Service : The A.W. 27s : Private Coaches : Mileage

LAST Sunday saw the change-over to summer schedule for most of the firms at Croydon. Imperial Airways will run four services daily on the Paris line as well as on numerous other routes, amongst them Prague and Zurich. K.L.M. starts the summer season with no less than seven services each way daily between England and Holland. For the further ramifications of these lines beyond Amsterdam or Rotterdam it is necessary to consult the time-table, but they appear to link up with most European towns of importance. In the K.L.M. time-table, by the way, I see something which appears to be new—an arrival at Croydon scheduled for 0.00 hrs. It does not come into force until later in the summer, however. This means that passengers will be in London at about 1.00 a.m., which is about as late as anyone would want to reach a city so far from gay as our Metropolis.

Nomenclature

British Airways (are they staying at Croydon or moving back to Gatwick now that the tide is on the ebb?) are placing the first of the Lockheeds on the Paris service, and the first flight was made by Mr. Lynch-Blosse. He is actually, I am told, the official "Commodore" of the British Airways fleet. This sounds like the old post of Chief Pilot under a new name, which most companies abolished some time ago in favour of an Air Superintendent. Ideally, perhaps, there should be two officials working in very close co-operation—an air superintendent on the ground and a chief pilot spending most, but not all, of his time actually flying along the company's various routes.

Talking of the Electra, I hear that those ordered by K.L.M. are to be used on the company's shorter routes, where very high speeds are of the greatest importance. The Lockheed "14" cruises at 240 m.p.h.—30 m.p.h. faster than any other commercial machine on American routes. This speed will bring Holland within about an hour's flying from England.

Another Electra

Lord Beaverbrook's Electra, assembled at Liverpool after boat transport from America, was flown from Speke to Croydon in sixty-five minutes, the distance being not far short of 190 miles. There was something of a head-wind at the time. The pilot was Mr. Downs, of the same nationality as the aeroplane (or airplane?). Assembly at Liverpool was carried out by Rollasons under the personal supervision of Capt. Rollason.

Olley Air Service report intensive activity in special charter work. An interesting example of "service" was given by this firm when faced by the problem of an American citizen who was stranded in England with little or no money. The client's New York bank was cabled from "Olleys'" Croydon office and a supply was cabled back. The client only made contact with Olleys at 12.30 p.m. and his boat for the United States was leaving Southampton at 12.45. However, all was arranged by 4.0 p.m. and the grateful passenger was flown to Cherbourg and caught his boat at 5.30 p.m.

The arrival of the first of the new Imperial Ensign machines is still weeks away, it seems. February was the original delivery time to be confidently forecast. Nobody will be so disappointed as Imperial Airways, who must have counted on these aeroplanes when planning their summer schedules.

Everyone at Croydon who knows him will be pleased to hear of Mr. Sutton's appointment to the post of Chief Preventive Officer. The problems involved in getting passengers quickly through the necessary formalities, whilst at the same time performing the essential task connected with customs regulations, will be in very capable hands. If passengers have dutiable goods or have failed to declare them, delay is inevitable, but the solution to this problem has been found by some of the companies who now refuse to keep coaches waiting. Other means of transport are found for the late ones where possible.

Imperials are experimenting with a fleet of six-seater saloon cars, each one of which departs for London as soon as its complement of passengers and their luggage is ready. It must be hideously expensive, for it costs nearly, if not quite, as much to run a six-seater as a 25-30-seater, and nobody can pretend that the "occasional" seats in such small vehicles are very comfortable.

Well known at Croydon for very many years indeed, and one of the first civil pilots to use this airport, Commander Ivan Smirnoff, of K.L.M., claims more mileage with a commercial company than any other pilot on the air routes. His total, when he landed in Amsterdam the other day after a fast special charter to Aden and back, was given as 1,875,000 miles—covered in 15,000 hours.

A. Viator.

Pacific Survey

WHEN *Flight* went to press last week the P.A.A. boat which is surveying the U.S.-New Zealand route, had reached Pago Pago (Samoa). Since then the machine, commanded by that Pacific expert, Capt. Musick, has reached Auckland after a final hop of 1,850 miles.

R.A.S. Consolidation

FROM the point of view of the holiday traveller—who, for the present, is internal air transport's best customer—the most important development in Railway Air Services' 1937 plans is the introduction of a daily London-Isle of Man service in each direction.

This has been made possible by the addition of an afternoon service between London, Belfast and Glasgow, on which the machines will automatically call at Ronaldsway. Previously it was possible to reach the Island by travelling on the morning mail service and changing at Liverpool, but a return had to be made by air and rail since there was no suitable service beyond Liverpool. The new service leaves Croydon at 3.25 p.m., and Ronaldsway at 5.20 p.m., so that the best part of the day may be spent at each end before return.

The company's full summer "plan" comes into action on May 10 and two new aerodromes appear in the year's time-table. These are Cheltenham-Gloucester (already open) and Exeter (to open on June 1), both of which are on the Birmingham-Cardiff-Plymouth route.

Generally speaking, the R.A.S. services are similar to those operated last year—with additional services over certain more popular routes—and the route map appears to have settled down to a definite form. This is not without similarity to that suggested by the Maybury Committee, but water-crossings are sensibly favoured and Croydon (not Manchpool) is the inevitable operational base, since Imperials supply the pilot and maintenance staff.

NASCENT GIANTS

America Develops a Four-Engine Complex : Sub-Stratosphere Services in Sight : An Ambitious Programme by Boeing

The *Ensign's* U.S. counterpart : A drawing indicating certain of the salient features of the Boeing 307, some details of which are given in the accompanying matter.

SINCE Imperial Airways demonstrated the practicability of large four-engined aircraft in every-day service the big air lines of the world are becoming four-engine-conscious. The trend to quadruple power plants, of course, would have been inevitable in any case. Operators are demanding increased payload capacity in machines for trunk line service, which means that designers must seek more power. The highest-rated engines available for commercial use deliver between 1,000 and 1,200 h.p., and in the Douglas D.C.3 we see demonstrated performance approaching the ultimate which may be expected from such units when used in pairs on transport aircraft. Triple engines mean inferior efficiency to the technician, and increased discomfort to passengers (despite the fact that some of the most popular commercial types—e.g., the Junkers Ju.52—have had a nose engine in addition to those on the wing), so the pendulum seems to be swinging toward the four-engined arrangement.

It may be recalled that experts representing Transcontinental and Western Air, American Airlines, United Airlines, Pan American Airways and Eastern Air Lines pooled their knowledge to aid in the designing of a large four-engined transport aircraft to be constructed by the Douglas company. Reports indicate that there have been technical hitches and that construction is behind schedule, but that the first machines should be in service in a few months.

The D.C.4 resembles, essentially, a scaled-up D.C.3 with four engines (Wright Cyclone Gs or Pratt and Whitney Twin Wasps), but with wings of a different plan form. The most striking feature is the tail unit, which seems to have triple fins and rudders, one placed centrally and the others at the tips of the tailplane.

Carrying a crew of five, the D.C.4 will have space for forty passengers, its gross weight being in the neighbourhood of 30 tons. The span and length will be 138 ft. 3 in. and 97 ft. respectively. A maximum speed of 237 m.p.h. is expected, and the cruising range should be about 2,200 miles. The landing speed seems on the high side at 68.5 m.p.h., and the ceiling is calculated to be 24,000 ft.

Pan American Airways and Transcontinental and Western Air, presumably unwilling to wait for the D.C.4, have placed orders with the Boeing concern for a number of machines to meet similar requirements.

The first two of the new craft will be special models for Pan American Airways, and will differ from the six 307s ordered by T.W.A. in that they will be equipped for continuous operation at 20,000 ft. Pan American has an option on seventeen of the first batch of twenty-five standard 307s to be built by Boeings. It has been agreed that after the two P.A.A. high-altitude machines have completed 500 hours' flying their special equipment will be made available for all Boeing 307s.

Basically, the 307 is a four-engined low-wing monoplane with four G-type Wright Cyclones mounted forward of the leading edge. The engines will give 1,100 h.p. for take-off and 950 h.p. for continuous operation, and the aircraft will weigh over 21 tons, being equipped to carry thirty-two passengers for day-time operation, and to be fitted with eighteen berths and eight seats as sleepers. The wing span will be about 107 ft. It is believed that in a number of features it will resemble the "299" or Y1B-9 bombers, thirteen of which are being delivered to the U.S. Army Air Corps.

At 20,000 ft. the special Pan American 307s will cruise on 75 per cent. power at 266 m.p.h. There is a possibility that these aircraft will be used experimentally for transatlantic work. Their cabins, when used for high-altitude passenger carrying, will be supercharged to a pressure of 6 lb./sq. in., although it is planned in the early stages to use not more than 2½ lb. pressure. This figure will be sufficient, it is claimed, to provide at 20,000 ft., and even higher, conditions experienced in a conventional transport aeroplane flying at 8,000-12,000 ft. The service ceiling of the special high-altitude type of 307 will be 35,000 ft.

The supercharger used to feed the cabin will be a mechanical type and will draw air through an intake valve well out along the wing, whence it will be pumped inside the wing structure through a miniature air-conditioning plant near an inboard engine and thence into the sealed cabin. Ducts will distribute it uniformly from the control cabin through the passenger compartments and into an "anti-pressure" chamber in the rear of the fuselage, where the exhaust valves are located. The complete set of dual superchargers will require only a small fraction of the power of one engine. The supercharging elements and cabin pressure equipment alone will cost forty thousand dollars.

It is known that the Glenn L. Martin company has been doing a considerable amount of research work on the question of high-altitude operation, and at the recent annual meeting of the Institute of Aeronautical Sciences Mr. McDonnell of that concern showed a drawing of a projected four-engined transport, generally similar to the Douglas and Boeing in conception, but embodying twin fins and rudders after the Lockheed manner.

Super Charter

OLLEY AIR SERVICE have been asked by Sir Hugo Cunliffe-Owen to provide the crew for the *Clyde Clipper*, which has been entered for the New York-Paris race. This crew will consist of a captain, first officer and radio operator.

Meanwhile, Olleys appear, from all accounts, to be going ahead with their plans for the Scilly Islands service, which was first considered by Sir Alan Cobham a couple of years ago.

Useful Co-operation

THE Percival Vega Gull which has recently been delivered to De Havillands for airscrew demonstration work, is the first production machine in this country to be fitted with a constant speed D.H. v.p. airscrew. The Vega Gull has been chosen largely because its four-to-one speed range makes it an eminently suitable type for such demonstrations—and it can carry three observers, with the pilot, in comfort.

Commercial Aviation

North Eastern

ON Monday North Eastern Airways, as foreshadowed in last week's issue, extended their services to Aberdeen. The through run is now covered daily and considerable fare reductions have been made. The single fare between London and Newcastle is £3 15s., while that between London and Aberdeen is £6 10s.—a figure which is not unreasonable in comparison with that charged for first-class sleeper rail travel.

The company is extending its activities into the charter field, with a centre at Doncaster, where single- and twin-engined machines will be stationed.

Marking "Cones of Silence"

IN order to supplement the "cone of silence" indication of the normal radio range beacon, a special vertical beam, known as a "Z marker," has recently been developed by the U.S. Bureau of Air Commerce. A receiver provides both aural and visual indication, and the marker signal is superimposed on the normal range signal as the machine passes over the beacon. Judging from the descriptions, the aural signal will closely resemble that of the marker signals heard in the normal short-wave approach systems which, too, are superimposed on the continuous approach-beam note.

Cook Strait's Year

DURING the twelve months previous to December 31 last year, Cook Strait Airways, of New Zealand, carried 12,761 passengers and nearly 35,000 lb. of mails and freight.

The first flight on the extension service opened by this company from Nelson to Hokitika was to have taken place on February 23, but a severe storm caused its postponement until the following day.

Capt. G. B. Bolt, chief pilot of the company, left Nelson at 8 a.m. in a D.H. Rapide and landed at Greymouth at 10 a.m.—taking just double the time which was expected. Owing to the unsettled weather conditions after the storm the machine had to follow the coast instead of taking the more direct route.

South Atlantic Additions

TWO machines have been added to Air France's South Atlantic mail fleet during the past week. The four-engined Farman which was specially prepared for the North Atlantic experimental flights to be carried out by Paul Codos via Lisbon and the Azores has been handed over for this service, since the North Atlantic trials have been postponed pending, it is believed, further negotiation with the Portuguese authorities.

In addition to this Farman 222, the veteran four-engined Bleriot S190 *Santos Dumont* has returned to Dakar for active service. She has spent over a year at the Etang de Berre, Marseilles, undergoing a complete overhaul after thirty crossings of the South Atlantic.

The G.E.s Get Together

THE Association of Aeronautical Ground Engineers held their first annual meeting last Monday, when a statement of general and financial position was made and officers were re-elected. Of the some 3,000 G.E.s available for membership at the present time, something like 120 have joined.

There is undoubtedly a real and growing need for this Association throughout the British Empire, and no one knows this better than the G.E.s themselves. Recently a letter of good wishes was received from a similar body which has been established for some years in the U.S.A. and has given valuable assistance over there. The aims of the Association, which has been mentioned from time to time in *Flight*, are chiefly to raise the status of the G.E. and to safeguard his interests, for it is realised that in a few unfortunate cases such things as a fully justifiable decision by a G.E. to write off an aircraft, which the lay committee of company or club consider should give further service, may mean dismissal.

Another job is that of finding positions for members in convenient localities. The present boom period and paucity of good G.E.s cannot be interminable.

Up to the present time the work of honorary secretary has been ably carried out by Mr. Robert S. Moore, E 3, Croydon Road, West Wickham, Kent. An assistant has now been elected to help him, but even so it is more than a whole-time job for these two members to deal with all correspondence as well as to search for and write to prospective members. Every member should, therefore, try to interest other G.E.s in his area, for the future success of the Association naturally depends entirely on a large increase in membership.

Warsaw—Palestine

ON April 5 Polish L.O.T. opened their new air service between Warsaw and Palestine, the route being covered in two days' flying with a stop at Bucharest. There is a connection between Helsingfors and Warsaw, and the whole distance of 2,700 miles is covered in 34 hours after a start at 1 p.m.—somewhat later than might have been expected in order that the northern connection may be made.

British Airway's Appointments

PREVIOUSLY with South African Airways, Mr. C. T. S. Capel, M.B.E., has been appointed to the post of chief engineer to British Airways. Before joining S.A.A., Mr. Capel represented the Armstrong Siddeley concern as adviser in Australia, Canada, and the Netherlands. His M.B.E. was the result of his pioneer work with Sir Alan Cobham on the Australian route.

Mr. R. A. Hall is filling a new post which has just been created—that of research engineer for the company.

For Aerodromes and Repair Shops

WELL known for their range of engines, stands and trestles made to both Air Ministry and their own designs, Ernest Lake, Ltd., of Dunmow Road, Bishop's Stortford, also specialise in the development of new equipment to deal with the growing demands of aerodromes throughout the country. Small rubber-tyred "parts," trolleys and ground markers are among the many products of this firm, who even include a non-poisonous degreasant, Colosyl-XTL, for floors and benches, on their lists.

A Martin Super-Clipper

TAKING advantage of their experience with the model 130 "Clippers" in service with Pan American Airways and of the high outputs offered by the new Series G Wright Cyclones the Glenn L. Martin concern is building a new machine of larger dimensions and higher performance than its predecessor. Bearing the works number 156 the new flying boat will carry 46 passengers and a crew of seven, but will be convertible into a 26-berth sleeper. The engines will be four Wright Cyclone G-2s giving 850 h.p. each at 2,100 r.p.m. at 5,800 ft., and the estimated maximum, cruising and landing speeds respectively will be 190 m.p.h., 160 m.p.h. and 70 m.p.h.

Although resembling the 130 in a number of major characteristics, notably in that the sponsons are retained to give lateral stability on the water, the new machine will have a wing of different plan form and will be provided with twin fins and rudders.

The main dimensions of the Martin 156 are: Span 157 ft., length 90 ft. 7 in., and height 24 ft. 9 in. The wing loading will be 27.1 lb./sq. ft., and the empty and gross weights 29,357 lb. and 62,000 lb. respectively.

Wrightways Go Ahead

AFTER the re-organisation following their move into new and larger quarters at Croydon, Wrightways have now settled down.

In addition to the Paris newspaper service, Army co-operation and general charter work—carried out with a fleet of one D.H. 86B, two Rapides and a Dragon—they are busy with sub-contract work. To this end a good deal of new and special machinery has been installed, and the end of the hangar has been "isolated" for the work. There is an impression of tidiness and efficiency about the shops which could naturally never be achieved in what were, after all, only temporary quarters.

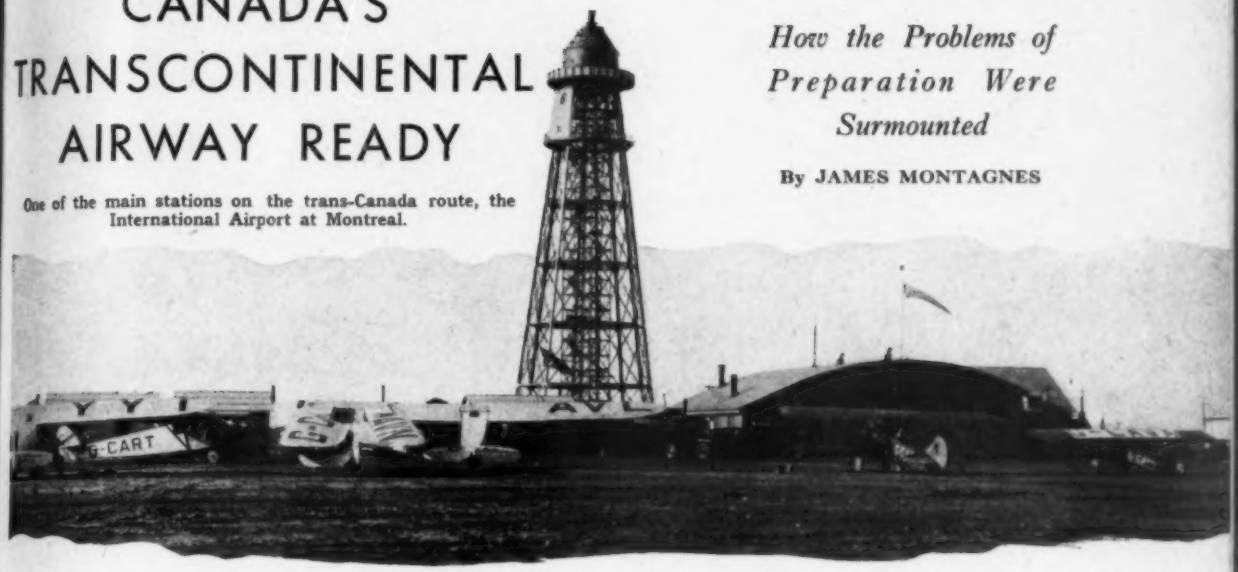
The 86B is very completely fitted out for all-weather flying and it has, in addition to the expected blind-flying instruments, Lorenz ultra-short-wave receiving equipment. This should be worth its cost and weight on a job such as the early morning newspaper service now that Croydon's transmitters are in action. Only de-icers are missing—and the only British commercial machine to be fitted with these is another 86 which is being used by Imperial Airways. In due course we shall learn how the equipment—in this case Dunlop Anticers—performs in real operating conditions. British Airways' new Electras are, of course, fitted with Goodrich pneumatic de-icers.

Incidentally, as "A. Viator" remarked in his notes a few weeks ago, Mr. S. L. Turner is back again as a part-time pilot to be called upon when necessary to assist Mr. Duggan. Another pilot, Mr. Brent, will be coming in shortly. The latter has been with Jerseys and should know all about it.

CANADA'S TRANSCONTINENTAL AIRWAY READY

How the Problems of Preparation Were Surmounted

By JAMES MONTAGNES



One of the main stations on the trans-Canada route, the International Airport at Montreal.

CANADA'S first complete transcontinental air service is expected to start operation this year. It will eventually bring Halifax within sixteen to eighteen hours of Vancouver, and feeder services will connect northern Canada with the cities near the U.S. border During the past year Canada has worked hard in order that the airway may be ready for use at least as soon as the regular Atlantic services are started.

The greatest problem concerned the bridging of northern Ontario, which is an almost uninhabited region of lake and virgin bush. This area formed the real reason for the fact that no transcontinental service had previously been developed. Next in importance, so far as difficulty is concerned, was the spanning of the Rocky Mountains, over which the lowest practical pass is 4,500 feet above sea-level—and surrounded by 10,000ft. mountains at that. In neither of these regions was it easy to lay out aerodromes.

Northern Ontario has been bridged by nearly fifty landing grounds between Quebec and Manitoba, which have been laid out by an army of unemployed. These have braved winters, with a temperature of 20 and 30 below zero, to cut down trees, dynamite and burn stumps, fill in muskeg swamp with rocks and boulders, level fields and runways, and keep the encroaching bush from once more making a wilderness out of the cleared field. In summer these men had to fight big black flies against which mosquito netting is no safeguard.

In the Rocky Mountains twenty-five airports were built at a variety of altitudes, but all spaced at twenty-five or thirty-mile intervals, and here another difficulty cropped up when the four-way radio beacons were installed. The mountains, not unnaturally, distorted the beams. In order to overcome this problem two or more beacons had to be installed at each location and the number of marker beacons had also to be increased. There are to be some twenty-five main radio beacons over the entire route.

The ground operations will be carried out by the Air Service Branch of the Dominion Department of Transport; and the work includes the development of airport lighting as well as radio. A teleprinter weather service between hundreds of observation stations is ready to start operations over the entire route. Something like $10,000,000 will have been spent by the Government on ground organisation when the service is opened.

The route will be from Halifax to St. John, New Brunswick, across the State of Maine, to Montreal, where the transatlantic service will be met. From Montreal it will run via Ottawa Emsdale, Cobalt and across northern Ontario to Winnipeg. At Emsdale the services from Toronto and Buffalo will connect with the main system. Winnipeg, Regina, and Lethbridge are the next major stopping points, and thereafter machines will fly to Cranbrook, Princeton and Vancouver. United States lines have their termini at Winnipeg and Vancouver, while Arctic routes connect at Winnipeg and Lethbridge.

The whole operational work will, as already explained in *Flight*, be in the hands of a private company with strong railway and Government interest.

(Above) One of the nearly a hundred emergency landing fields constructed out of the bush in northern Ontario, British Columbia and sections of the prairie provinces, on the route of the trans-Canada airway.

(Right) Workmen levelling a landing field cut out of virgin bush in southern Manitoba.

STRAIGHT OFF THE LINE: A Bristol Blenheim medium bomber fresh in its camouflage paint. The Blenheim is the fastest machine of its type in the world.

BRISTOL BRETHREN

A Famous Trio of Twin-engined Monoplanes—the Britain First, *Blenheim and* 143

SO brilliant have been the performances put up by the Bristol monoplane *Britain First* and its companion type, the Model 143, and so close is the resemblance of these machines, particularly the former, to the Blenheim medium bomber now in production for the R.A.F., that detailed information on their structural features and flying qualities has been withheld. Lately, however, the Bristol Company has made some interesting disclosures, perforce of a somewhat general nature, relating to these outstandingly successful aircraft.

It will be recalled that the prototype *Britain First*, or type 142, was built to the order of Lord Rothermere and was intended to demonstrate the capabilities of an up-to-date British aeroplane. The results obtained were so excellent as to lead the Air Ministry to request the development of a medium bomber on similar lines. Bearing the Bristol works number 142M (denoting the similarity to its forerunner) and the Service name Blenheim the military machine is now in large-scale production at Filton.

The third machine of the trio under discussion is unnamed but bears the designation 143. This model is planned on similar lines to the 142 and Blenheim but is intended for economical commercial operation, being fitted, to this end, with sleeve-valve Aquila engines of lower power than the Mercuries in the other two types. Production of the 143 has been postponed indefinitely owing to magnitude of the work being undertaken at Filton in the interests of national defence.

A *Famous Prototype*

Britain First, the senior member of the trio, was designed as a six-passenger monoplane, having a low cantilever wing and mounting two radial engines.

The fuselage is composed in the main of bulkhead formers and fore-and-aft stringers covered with sheeting, the whole being of aluminium alloy. The portion forming the pilot's cockpit is of similar construction on the underside but the upper and extreme forward sections are made up of tubes which form the base for window framing.

Tapering in plan form and thickness the main planes have front and rear spars embodying H.T. steel flanges and light alloy webs, the whole being riveted together. The light-alloy ribs have circular flanged holes and are riveted to the spars; the covering is of light alloy sheet riveted to the spars and ribs. The centre section picks up on the fuselage by channels on the spar faces bolted to the main fuselage formers and the outer wing panels are secured by bolts.

A fixed tailplane is used (resembling, like the fin, the main planes in structure) while the ailerons and elevators have a steel tube as their basic member, their light-alloy ribs bearing fabric covering. The post which forms the basis of the fabric-covered rudder structure is built up of light alloy and carries the ribs and hinges.

Each engine-mounting is built in two portions. The rear part is of steel tubes and picks up on the faces of front and rear spars, while the forward portion, forming the base of the engine cone mounting, is of similar construction and carries the mounting ring. Tubular framing is attached and forms the base for the nacelle fairing.

Though originally designed to take two Bristol Aquila sleeve-valve engines, the Bristol 142 was produced in the first instance with the more powerful Mercury VIs rated at 605 h.p. at 12,500 ft. Subsequently these units were replaced by a pair of Mercury VIIIs delivering 825 h.p. apiece at 13,000 ft. with a maximum output of 840 h.p. at 14,000 ft.

Low-drag long-chord cowlings with leading-edge exhaust collector rings are specified, and the airscrews are three-bladed variable-pitch de Havillands.

The undercarriage is made up of port and starboard units embodying medium-pressure wheels and twin shock-absorber struts. These units retract rearward hydraulically and are housed in suitable fairings at the rear of the engine nacelles. A castering tail wheel is fitted, this having a shock-absorber unit and being arranged to return to the "aft central" position when it leaves the ground.

Standard lighting and navigational equipment is carried together with a landing lamp in the nose of the fuselage, and wireless may be fitted just behind the pilot's seat.

Little information is available on the Blenheim medium bomber other than that which has already appeared in *Flight*. It may be pointed out, however, that in this machine (arranged as a mid-wing monoplane to facilitate bomb stowage) the tail wheel retracts with the main undercarriage. The Blenheim carries a crew of three—a pilot and navigator in the nose and a wireless operator *cum* rear gunner in the aft portion of the cabin. The engines are Mercury VIIIs and the principal overall dimensions as follows: length 39 ft. 9 in., span 56 ft. 4 in., height (tail down) 9 ft. 10 in., maximum depth of fuselage 5 ft. 6in., maximum width of fuselage 4 ft. 4 in., diameter of airscrews 10 ft. 6 in.

The Bristol 143 is a low-wing monoplane designed for the transport of passengers, freight or mail. The normal accommodation is for a pilot and navigator and eight passengers. There is a lavatory compartment aft of the cabin and about 60 cubic feet of baggage space.

Windows are provided not only in the sides, but in the roof of the cabin and, although normally fixed, they may be pushed out bodily after releasing their safety locking mechanisms, affording means of exit in an emergency.

The two 500 h.p. civil-rated Aquila sleeve-valve engines have long chord cowlings with leading-edge exhaust collectors and are fed from two fuel tanks located in the centre section of the wings, each having a capacity of 102 gallons. The oil tanks are in the leading edge of the centre section, each having a capacity of 10 galls., and the coolers are of the skin type.

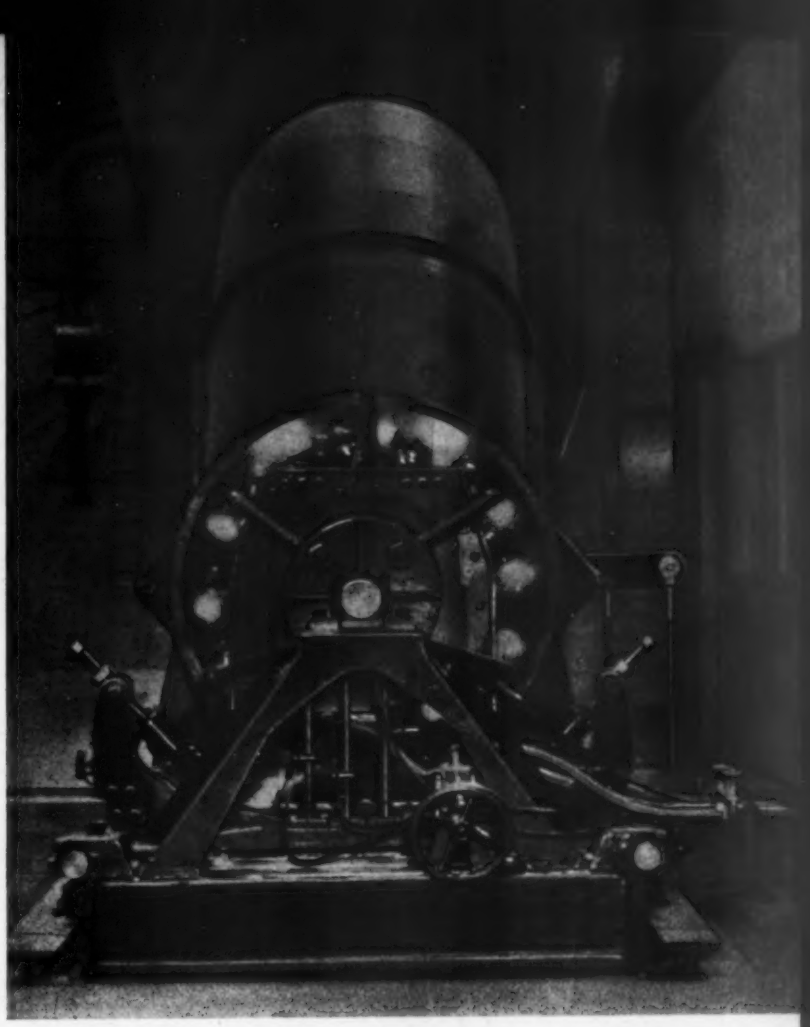
The span of the 143 is 56 ft. 6 in., length 42 ft., and height 12 ft. 3 in. Its loaded weight is about 9,000 lb., its speed approximately 200 m.p.h. and its range over 1,000 miles.

Up-to-the-Minute ENGINE TESTING

A Visit to a Modern Factory Now Going into Production with Big Radials : Ingenious Test-bed Layouts at the Alvis Works

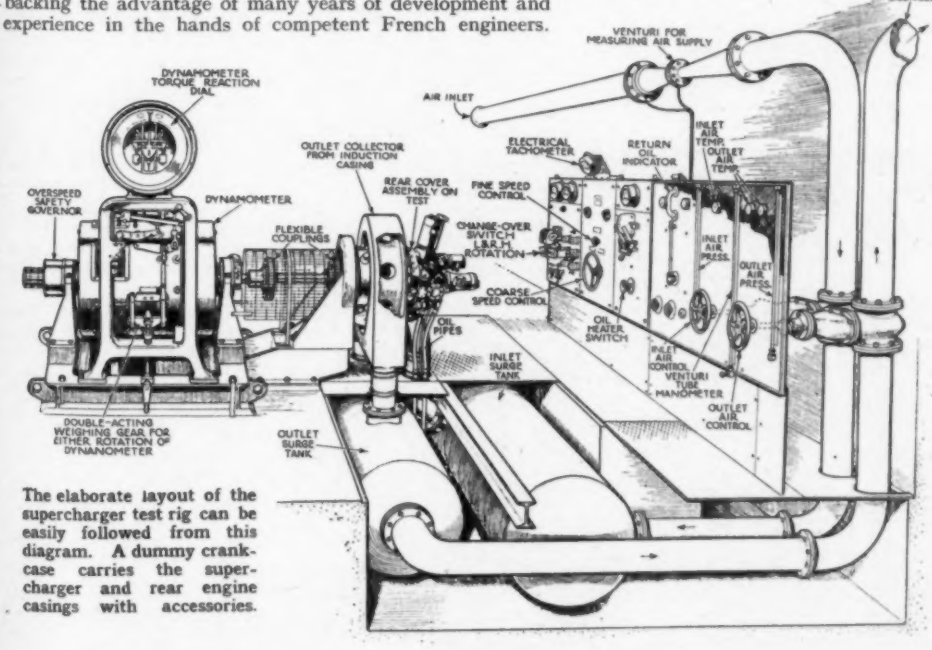
HOW often one hears among flying folk a statement to the effect that "So-and-so have been going to bring out a new engine for over a year. They ought to be in production by now." A brief survey of the works layout and a fuller description of the testing plants and procedure of a firm which has recently entered the aero engine market will perhaps serve to illustrate just how far-reaching are the problems confronting a would-be manufacturer.

For two important reasons the firm in question—Alvis, Ltd., of Coventry—has been spared some of the difficulties which would normally be experienced by an organisation in this position. In the first place the company has for many years produced cars which rank among the finest in the world, and which, therefore, require a standard of workmanship comparable with that necessary for successful aero engine manufacture. Secondly, the engines now being produced under Gnome-Rhone licence, though considerably modified, are not of a new and untried type. On the contrary, they have as a backing the advantage of many years of development and experience in the hands of competent French engineers. (Over 100,000 Gnome-Rhone engines have been assembled!)



FULL BORE : Flames flicker from the exhaust ports of a two row, 14-cylinder, radial engine on the Alvis test bed. On the right may be seen the dynamometer torsion arm connected to indicator and control in the cabin.

Governing the building and arrangement of a factory are many factors which are unknown and of no real import to most of us, but it is fairly obvious that although an aero engine firm may arrange in the first place for quite small output, room and facilities must be considered for rapid expansion later. Until quite recently in very many factories machines were placed securely on concrete beds and driven by belts from overhead shafts; hence when production increased the machines which had at first been arranged in types—for example, milling, gear cutting and grinding groups—had to be arranged in bays to produce one job in large quantities. Then began



The elaborate layout of the supercharger test rig can be easily followed from this diagram. A dummy crankcase carries the supercharger and rear engine casings with accessories.

the trouble of change-over. Machines were laboriously "dug out," shafting and belts altered, new extensions built, and so on.

The 124,010 square feet of floor area in the new Alvis works is carefully planned to allow for large-scale production at a later date with a minimum of trouble and alteration. All the machines are motor-driven and stand on the wood block floors. Separate fuse boxes and leads for each machine can be plugged into the overhead, centrally controlled main. The roof of the shop is 3 ft. to 4 ft. higher than normal, and this, coupled with the lack of overhead obstructions, means exceedingly light and airy working conditions.

The arrangement of the departments and position of the 350 or so machines, mostly of the latest standard design, is clearly shown in the plan on the next page but one.

The heat-treatment department is equipped entirely with the latest Birlec furnaces, and quenching tanks, where necessary, are directly in front of the furnaces. An interesting point is that each furnace has beside it the foundations for a second similar furnace when the need for it arises.

The chemical laboratory, which is regarded as a part of the works, is seen from the plan to be centrally placed. All stores materials are subjected to the usual routine tests.

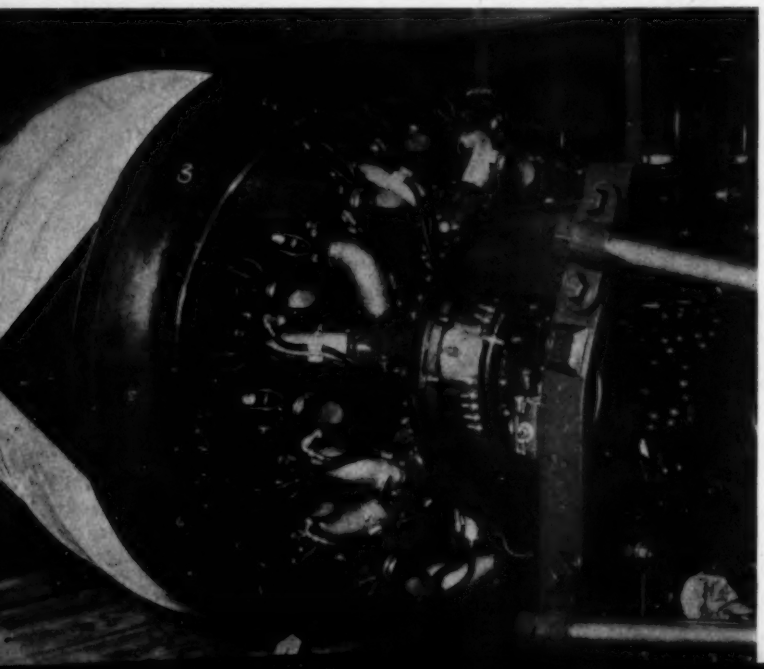
Beside the chemical laboratory is the physical department, in which may be seen a flexion fatigue-testing machine, an N.P.L. combined fatigue and torsion machine, and a 10-ton alloy and 50-ton steel tensile machine; with these there are the normal impact and Brinell hardness testers. Alvis have their own material specifications which fulfil all Air Ministry requirements and are within even stricter limits of their own.

A neat arrangement of inspection is employed whereby a bank of large pigeon-holes forms the wall between tables and outside corridor, and passed-off articles placed in the compartments are withdrawn from the outside and cause no congestion. Besides the usual visual inspection test there is the "Magnaflux" crack test, in which ferrous parts are highly magnetised and coated with a special detecting ink; as even microscopic cracks take up opposite polarity the deposit in the ink is attracted along the line of the crack, which then becomes clearly visible; the part is finally de-magnetised.

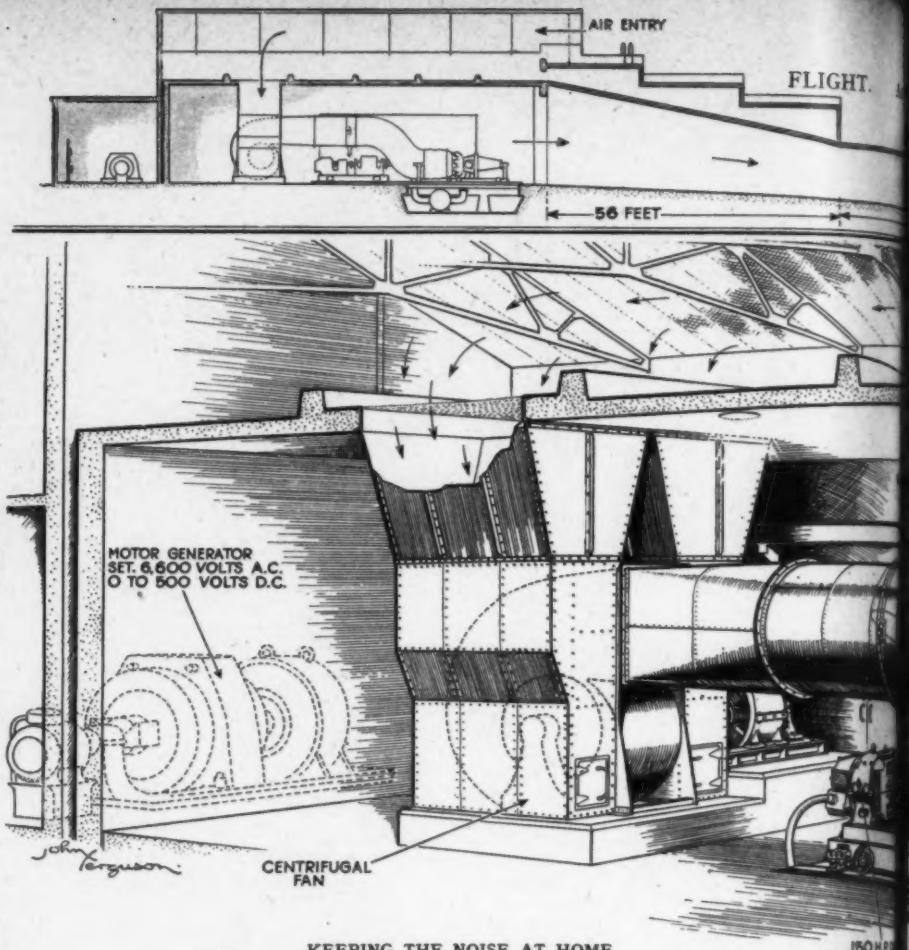
A number of Zeiss precision instruments are used, including a tool-room microscope for observing threads, gauges, jigs and tool forms, and there is also a Vickers thread projector for comparative inspection, and an apparatus for checking pitch and form of all gears. At one end of the department crankshafts are balanced, using special weights in place of the rod and piston assembly. Between stores and inspection department is located the tool room and the Genevoise—a separate compartment for two Swiss precision boring machines.

Over part of the inspection bay are the works offices, from which a view of all departments in the main building can be obtained.

There are four Alvis engine-testing divisions, namely, the experimental single-cylinder bed (beside which are foundations prepared for other such beds); a supercharger and accessories test, again ready for duplication; a most

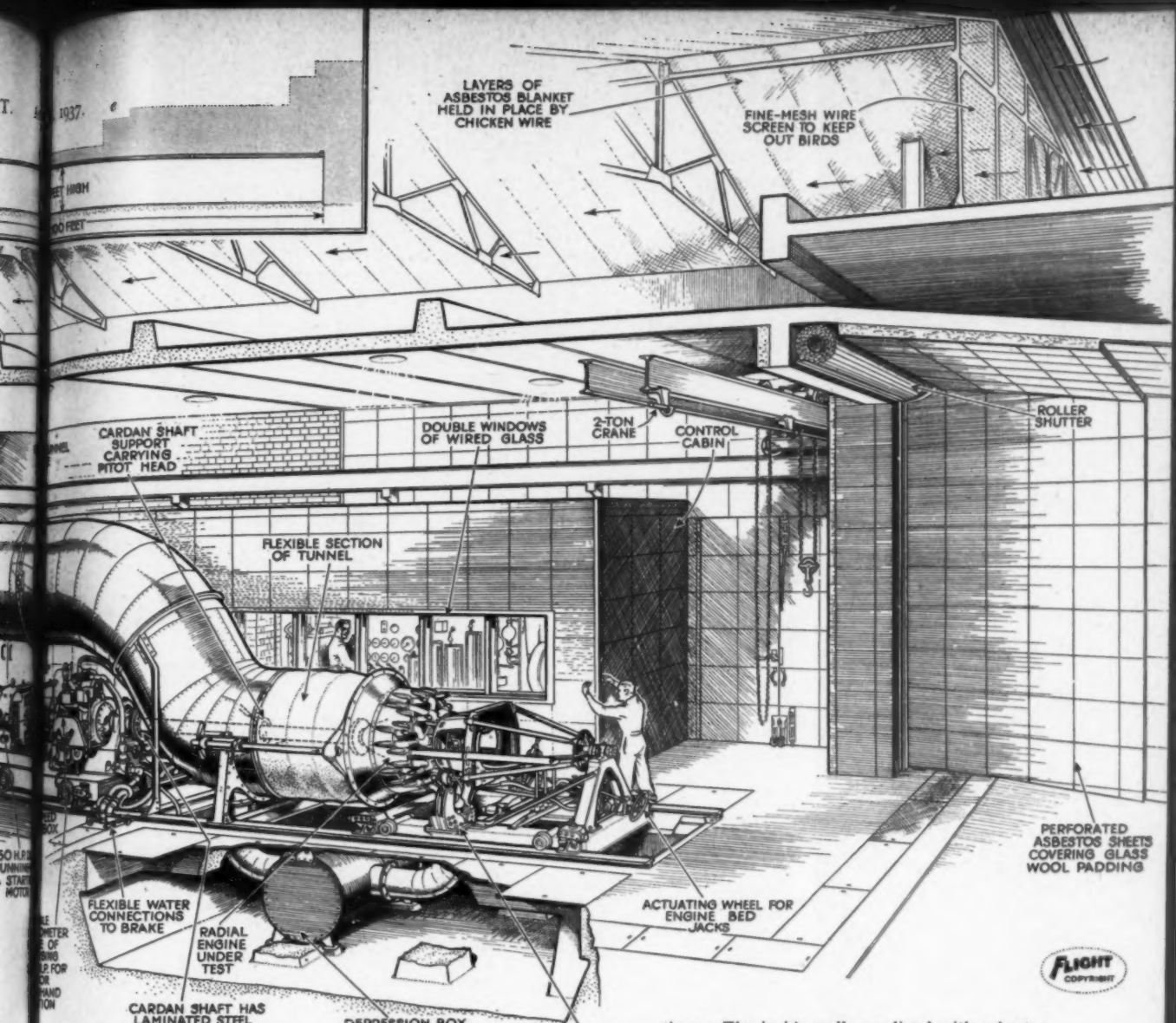


The first Alvis Pelides engine on test. The major departures from Gnome-Rhone practice that are externally visible—accessories and forked induction pipes—are at once apparent in this photograph



KEEPING THE NOISE AT HOME.

Better than words: In the drawing, and in the plan inset above, our artist conveys details of the construction of the "twin-shell" Alvis test house, of its equipment and of the arrangement of the various brake, starting and cooling units.


LAYERS OF ASBESTOS BLANKET HELD IN PLACE BY CHICKEN WIRE
FINE-MESH WIRE SCREEN TO KEEP OUT BIRDS
CARDAN SHAFT SUPPORT CARRYING PITOT HEAD
DOUBLE WINDOWS OF WIRED GLASS
2-TON CRANE
CONTROL CABIN
ROLLER SHUTTER
FLEXIBLE SECTION OF TUNNEL
PERFORATED ASBESTOS SHEETS COVERING GLASS WOOL PADDING
FLEXIBLE WATER CONNECTIONS TO BRAKE
RADIAL ENGINE UNDER TEST
ACTUATING WHEEL FOR ENGINE BED JACKS
CARDAN SHAFT HAS LAMINATED STEEL FLEXIBLE JOINTS
DEPRESSION BOX FOR ALTITUDE RUNNING
SPRING-DAMPED ENGINE MOUNTING PLATE
FLIGHT COPYRIGHT

completely equipped, sound-proofed experimental engine test house; and at present under construction at Coventry Municipal aerodrome, a few miles from the works, two rather less elaborate production test beds, with room for several more.

The single-cylinder test shop under the main works and beside the despatch department contains a test bed in miniature in all the essentials—dynamometer, air-cooling fan and silencing—while the thermometers, consumption and pressure gauges, tachometer, etc., are on a centralised control panel.

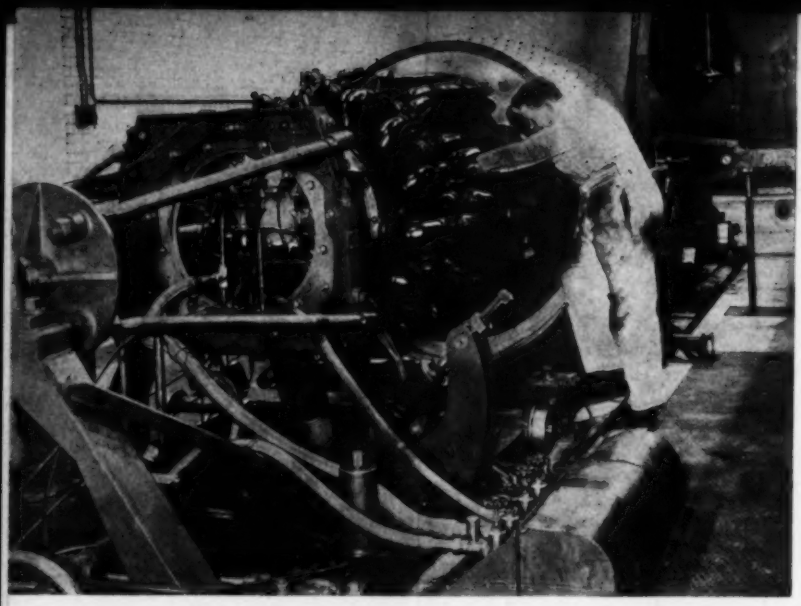
The supercharger test is of the latest design, and is most comprehensive. Blower and accessories are driven through Hardy flexible disc couplings by a motor with a safety overspeed governor. A dynamometer with double-acting weighing gear indicates the torque and horsepower absorbed for either rotation. The air intake into a large surge tank is via a venturi and valve controlled from the panel, which allow accurate adjustment and readings of airflow and altitude depressions. The mixture pressures in the volute and leaving the induction casing for the outlet surge tank can also be observed. Oil inlet and outlet temperatures and pressures are recorded, together with consumption, and lastly generator, starter, petrol pumps, etc., and their driving gears are run in and tested.

The main test house at the works is very complete and in every way modern. The building, which was constructed in co-operation with the N.P.L., using sound-absorbing material wherever possible, is double throughout, with a cavity between the two walls, and separate foundations. The inside walls are lined with asbestos wool and perforated asbestos sheet, and the floor is insulated from them with cork. A long, silenced tunnel leads away the exhaust gases and cooling air, reducing the noise of an engine running at full speed—which at close quarters would be painful to the ears—to a muffled, distant rumble. During the installation or removal of an engine a roll partition shuts off this tunnel from the main house. The cooling air intake through the roof is also silenced.

All controls, switches and instruments are collected in the control room beside the engine, and, due to the use of asbestos and glass wool for the walls, it is possible to talk in the room not three yards from where the engine is running.

The engine mounting is so arranged that all torque is taken on a rear flexible support and by two large springs holding the sides of the mounting plate. These features, which may be seen in the illustration, prevent any possible damage to the lugs on the engine. The whole mounting unit is on wheels to allow any size of engine to be tested and to be readily accessible. Normally the wheels are slightly raised from the track by four jacks.

A canvas section in front of the engine allows the cooling tunnel to be extended right up to the cylinders or drawn back out of the way for examination of the front engine components. The wind tunnel has a gauze at the top where air is drawn in between the two roofs. Air speed is controlled by varying a large butterfly valve and by altering the current of the 550 h.p. electric motor which drives the fan. Speeds up to 170 m.p.h. can be produced in the tunnel and as high as 200 m.p.h. round the cylinders.



A Gnome-Rhone engine with flame-trap "swellings" on the induction pipes, installed on the Alvis bed. Supporting springs, pivot head and other details of the torque-damping engine mounting can be picked out.

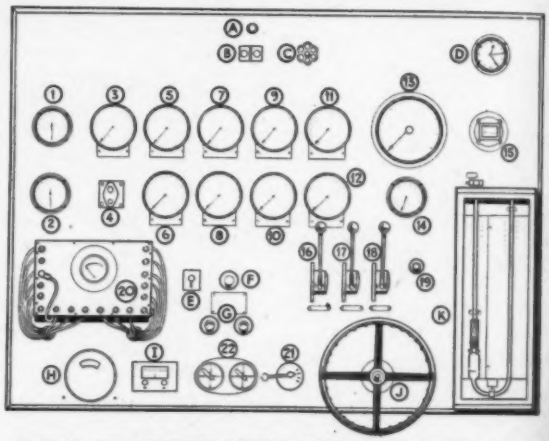
When a new engine has been installed on the test bed and all pipe lines and wires have been connected, it is run in for some time before actual testing and power checking. A 150 h.p. electric motor driving via a clutch through a two-speed gear box fulfils the two functions of starting and of "motoring" the engine before starting.

Series and Type engine tests as laid down in A.P.1208 are very exacting. A Type engine defined as a sample engine of new or modified design, after separate approval of all accessories, etc., and of the production methods employed, must pass the following tests: (1) Power curve and throttle consumption curve tests; (2) an endurance test of 50 hours in five non-stop periods, including 20 hours thrust test with an airscrew absorbing nine-tenths rated power, and 9 hours of the last 10-hour period at full throttle and calculated take-off power; (3) slow running and acceleration tests; (4) high-speed test at 5 per cent. over maximum permissible r.p.m.; (5) high-power test at maximum permissible r.p.m. checking oil consumption; (6) a further power curve test. Finally, the engine is run at various inclinations, consumptions are checked, and in the case of liquid cooling the pump capacity is tested. One-half per cent. of Series engines are re-type-tested.

Acceptance tests for all production series engines comprise a running-in period with gradual acceleration on specified fuel, verification of slow running and full throttle settings, and two hours' running at international r.p.m. at 90 per cent. rated power, except for the last five minutes, which are run at full throttle, and then the corrected power output must be within 5 per cent. of the international power rating. During the two hours all temperatures, pressures and consumptions must be checked.

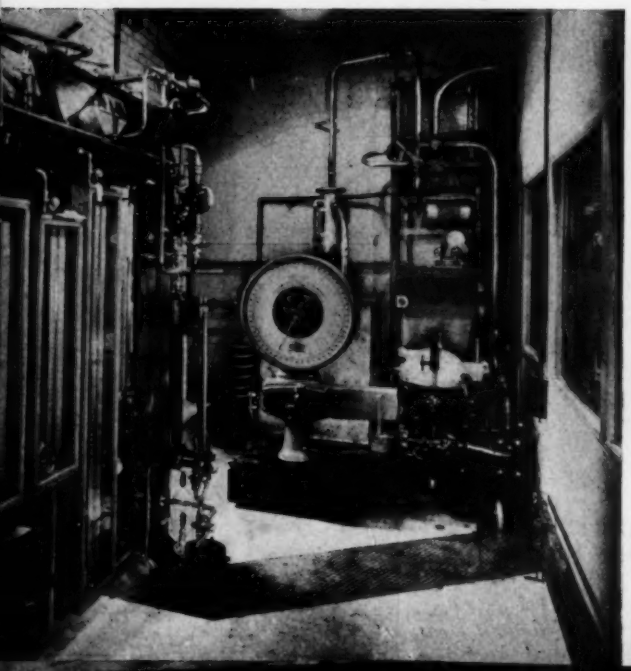
Following the acceptance tests an engine is completely stripped and inspected and after re-erection is run for half an hour under endurance conditions. Before the engine is passed-off a final power curve is taken and altitude control range, slow running, starting and single ignition power drops are recorded.

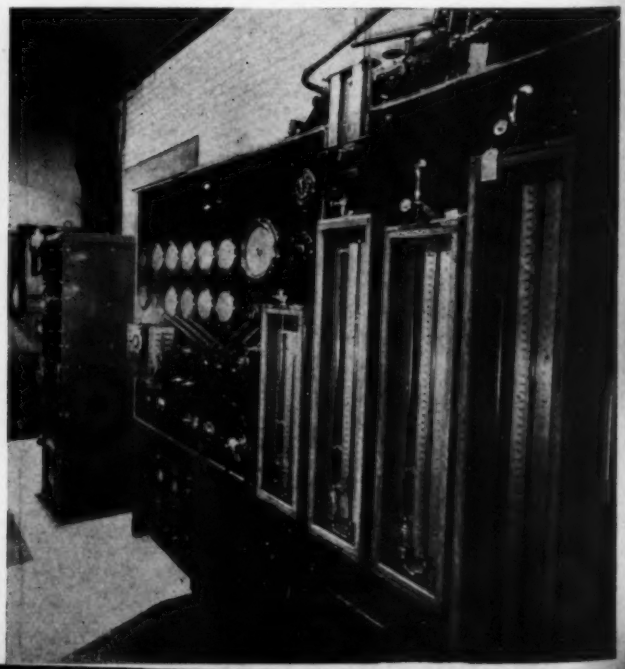
Many safety devices are incorporated in the testing apparatus to prevent the possibility of



A KEY TO THE MAIN CONTROL PANEL (Engine controls are numbered and test bed controls lettered):—(1) A.S.I. for movable pitot at cylinder heads. (2) A.S.I. for wind tunnel. (3) Petrol pressure after pumps. (4) Detonindex. (5) Air intake temperature. (6) Wind tunnel air temperature. (7) Induction mixture temperature at induction pipe. (8) Induction mixture temperature between carburettor and supercharger. (9) Oil temperature, inlet. (10) Oil temperature, outlet. (11) Oil pressure, inlet. (12) Oil pressure, outlet. (13) Main revolution counter from brake. (14) Direct engine tachometer. (15) Exhaust gas analyser. (16) Altitude control. (17) Magneto control. (18) Throttle control. (19) Spare drive or for Hasler tachometer. (20) Cylinder head temperature from thermo-couple. (21) Four-way ignition switch (off, one magneto on, other on, both on). (22) Each diaphragm of each pump shown separately on petrol pressure gauge above. (A) Oil heater indicator bulb. (B) Oil heater switch. (C) Oil water cooling cock. (D) Clock and stop watch. (E) Fast or slow switch for sluice control. (F) "Sluices closed" indicator bulb. (G) Sluice controls. (H) Brake water pressure. (I) "Over-rev." cut-out. (J) Altitude depression box valve (1mm. pressure difference per half turn). (K) Water column for wind tunnel pressure.

In the photographs below the chief features of the control cabin are shown. (Left) Mercury and water columns, barometer, fuel flowmeter, and oil balance and centrifugal cleaner. (Right) Starter switchbox, main control panel and, seen again, the pressure columns.





accidents or of damage to the engine. A switch controlled by the dynamometer water inlet prevents starting unless the water is turned on. A similar electric contact control on the starting dog makes it impossible for this to be engaged when an engine is already running. Again, before starting, the dynamometer sluices must be closed, that is, offering minimum brake resistance to the starter, and an indicator bulb is placed on the main control panel to show the closed position. Various other safeguards, operated by the flow of brake water dropping, by over-revving an engine, or by lack of cooling air, are also fitted.

The Heenan and Froude dynamometer is of a modified form with an extended torsion arm to the control room, and the new remote control from the panel. It is capable of absorbing up to 2,000 h.p. for either left- or right-hand rotation.

The following sequence of operations is employed for starting an engine on the beds: (1) Turn on the dynamometer water; (2) engage the starter dog; (3) switch on first the main, then the graduated fan motor control by degrees, allowing time for the fan, which is directly driven, to pick up; (4) set the main butterfly valve at about three-quarters open; (5) turn on the oil, and, if necessary, the oil heater, and wait for it to circulate, as shown by a glass indicator in the return pipe; (6) close the brake sluices; (7) switch on the starter motor and accelerate slowly; (8) turn on the petrol and prime the engine from the accelerator pump—that is, quickly open the throttle wide once or twice; (9) contact—switch on the ignition after scanning the dials of the engine instruments.

The majority of the instruments on the main panel need no explanation. Thermometers and pressure gauges record fully the state of air and induction mixture at the carburettor intake, between carburettor and blower, and at the induction port. A spring-loaded "Detonindex" and a thermo-couple in each cylinder indicate the behaviour of the charge and its temperature, and an exhaust gas analyser, from the final state of the gases, shows mixture efficiency.

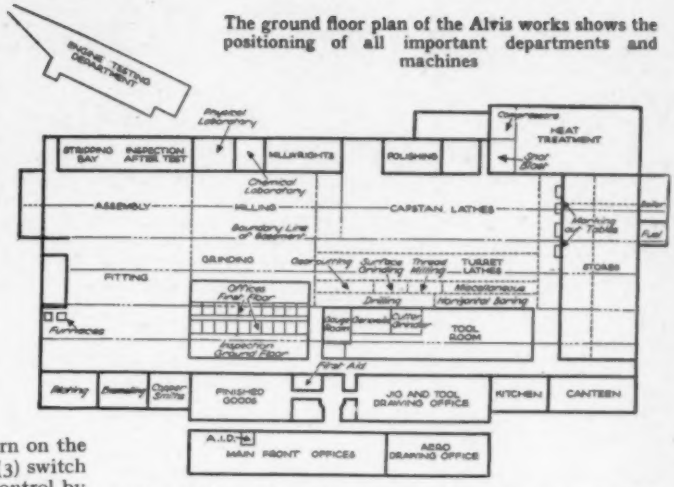
Two special switches working in conjunction with the petrol pressure gauge show separately the pressure at each diaphragm of each petrol pump.

The various mercury columns seen in the control room record air pressures in the tunnel, air depressions in the altitude box, and boost pressures. A barometer is included in the equipment to give absolute readings during the tests, and humidity is shown by a hygrometer.

A petrol flowmeter is shown in the illustration, and above it are two 2-litre graduated glass bulbs for direct consumption checking by timing. Three types of fuel are stored underground in tanks outside the test house.

Making a small adjustment on the single-cylinder experimental test bed. Part of the cooling duct is raised to give access to the engine.

The ground floor plan of the Alvis works shows the positioning of all important departments and machines



Artificial Altitudes

The large hand-wheel on the main panel controls the valve on the altitude depression box, one half-turn making a pressure difference of 1 mm. of mercury. Artificial altitudes of up to 15,000ft. are attainable.

Oil consumption is measured by weighing on an Avery balance, so that temperature differences do not affect readings as in the case of measurement by volume. The oil is passed through an Alfa-Laval size 1,500 centrifugal cleaner, and a glass section in the return pipe shows when the oil is flowing.

After having been itself tried out with a Gnome-Rhone 14.K engine, the main experimental bed is now being used for testing an initial batch of 15 1,000 h.p. 14-cylinder Pelides Major engines which are nearing completion. One of the first of these engines is at the present time being prepared for type test. Provision has been made for the manufacture of a further 75 engines following the completion of the 15. The large 1,300 h.p. 18-cylinder Alcides and Alcides Major will be the next Alvis engines to reach production, while drawings are nearing completion for the small-diameter, two-row, 14-cylinder Maeonides Major, to give 650/700 h.p.

Fractional h.p. Motors

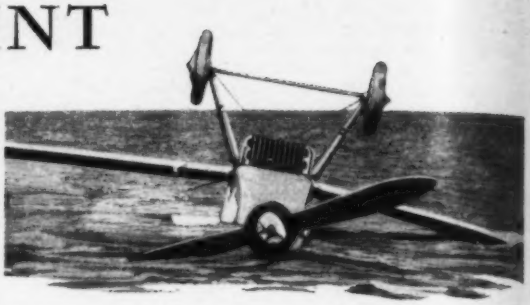
A NEW series of fractional horse-power electric motors is announced by Brook Motors, Ltd., Empress Works, Huddersfield. This "Cub" series, as it is called, includes capacitor, split-phase, and 2- and 3-phase types. The motors are stated to be silent in operation and are all fitted with special type sleeve bearings. No oil-bath is necessary, and attention to lubrication is reduced to a minimum by the use of oil wicks which, it is claimed, also give long bearing life.

The motors are fitted with cast-iron feet to present standard measurements, and are finished in cellulose with heavily plated bright parts.

BREAKING POINT

Or the Nature of the Beast

By "NAVIATOR"



I WAS present from first to last at the extraordinary affair following an accident to Lt. David Rigby, R.N. (F/O., R.A.F.), and I have come to the opinion that it is really a matter for psychologists. The facts are enough for me.

It was about eleven o'clock in the morning when the first news arrived. His Majesty's Aircraft carrier *Spurious* was three days out on the autumn cruise to Scapa, and we were doing the usual exercises. That is to say, six aircraft were doing deck landings, and the remainder of the ship were concerning themselves diligently with those little wardroom pastimes for which the *Spurious* bears an enviable reputation.

Suddenly the loud speaker grated. Although nobody could normally understand what was being broadcast, one could make a shrewd guess by looking at the clock and estimating what ought to be said at that time. But now the clock showed 10.53½, so a waiter was sent to listen closely to the broadcast.

The wardroom lackadaisically awaited his return. He came hurrying in. "Crash, sir!" he cried with that mixture of awe and thrill which makes a good marine. "It's Lootenant Rigby," he added, disappointed that his dramatic announcement had not created much of a stir.

"He would," remarked the Commander grimly. The Wing Commander said nothing, and the Stores Officer eyed him anxiously. Then, with one accord, they departed the wardroom and made their way to the nearest hangar lift. Most of the wardroom followed, for it is one thing to be a Wing Commander and order the lift to descend to take you "upstairs," and another to chase up eighty-nine steps to the flight deck.

Full Speed Ahead

As the lift rose flush with the top deck a gale howled across the flat expanse and made us all catch our breaths. Battling against it we hurried forward, and in a few moments stood in the lee of the funnel. Already the story was known; Rigby had landed in the sea some fifteen miles away, and the ship was "hitting it up" in an effort to save him and his aircraft. Already the attendant destroyer was ploughing through the sea ahead at a fantastic speed, a curved white serpent snaking magnificently from its bows.

Fifteen miles at thirty knots was a sum most of us could solve. We sat around morosely smoking cigarettes which were tasteless in the gale. Afar off we could see five aircraft circling in the sky, obviously over the scene of the accident. In a very short time we thought we could see a glint of silver in the sea, and soon afterwards the destroyer's screws were reversed and a mighty churning of ocean creamed the sea for half a cable.

We brought our glasses to bear. Rigby was all right. We could see his soaked and unkempt figure on board the destroyer, now curiously quiescent. The *Spurious* approached with caution, and after the captain had skilfully manœuvred his craft a boat was lowered. We saw the Squadron-Leader (E) sitting unhappily in the bows, and the boat seemed to take an inordinately long time over the passage.

There followed an aggravating delay. Mess call sounded, and a few *blasé* diehards went below to feed their faces. We others remained to watch.

Only the tail of the aircraft was visible. Someone called out that a line had been passed round the wreck, but the destroyer was drifting over her. There was a possibility that her back would be broken.

Finally, a decision was taken to salve her. This called for an expert manœuvring of the mammoth carrier, but with unbelievable skill this was effected so that a hoist was swung out from the *Spurious* and the swivel hook was attached to the tail of the ruined aircraft.

"Can't see what it's for," grumbled someone at my side. "She's a write-off, all right. They'll never let her fly with all that sea water in her. Still, they might salve the Watches, Aircraft, One," he concluded ironically.

After a prolonged delay the pathetic wreck was landed on the flying-off deck, where it lay crumpled, dripping, and grotesquely twisted like a swotted bluebottle. By this time most of the sightseers had departed for lunch, and an apathetic few remained to see the last rites.

There was a consultation. Flight-sergeants, W.O.s, officers: whisperings, pointings, deprecations, agreements. The wreck, so they said, was a total write-off, and all that could be done now they had salved it was to take out the engine and throw the rest back in the sea. "But," cautioned the Wing Commander, "we don't want any spars and so on floating about to be picked up by fishermen in their nets. Break her up properly." He, also, went to lunch.

Did I detect a malicious gleam in the eyes of those around me?

The airmen of the flight to which the crashed aircraft belonged were sent off quickly. In a very short time they returned armed with implements from hacksaws to trolleys, from pickaxes to choppers. The engine was removed with a few dexterous blows, and then the senior N.C.O.s seemed to lose interest. "Get on with it," barked one, and, with the superiority of a trained camel, hoofed it away.

The Rot Sets In

Now, I was but an onlooker to this scene. I knew many of the airmen by sight if not by name. I am at pains to describe them as excellent craftsmen, given to their work, whose care and maintenance I would willingly trust a thousand times again. But the sight of this broken aeroplane seemed to infect them with an unknown germ.

Have you ever noticed what wonderful destroying agents the best men are? Gladstone, Bernard Shaw, any first-class dramatic critic, cartoonist Low, any first-class game shot, and so on: are they not all in their work model men to whom comes a period of destruction, demolition, iconoclasm? Have you not seen on Guest Nights the wilful destruction of property? Have you not seen the parson slash the heads off flowers with a cane? Or small boys torturing a beetle? Or fat magistrates racking an impoverished delinquent? If you have, you will understand the attitude of these men, who, after years of self-discipline and restraint, after years of building and making, were at long last given an outlet for their passion for pulverisation.

In less time than it takes to tell, I saw reliable airmen and steadfast sailors whacking well and truly into wings, fuselage, empennage. An axe flashed in the air; an horrific rending answered its blow against a wing; a look of beserk delight spread across the amiable features of the wielder. A chopper sank to its hilt in a strut, and as it could not easily be dislodged the striker put his foot on the wood and crushed it with savagery. A sailor had

dismembered a generator, which now lay mute and useless on the deck; it was suffering outrageous blows from a fourteen-pound hammer, and the sailor hit with relish. A fitter sat in the crumpled cockpit; a fierce lust animated his face, and unholy noises came from within. Now pieces were taken to the side and flung overboard with exhilaration. The ship turned into wind, and ripped fabric flapped maddeningly. The W.O. at my side disengaged himself, and with zest tore it from its holding. A respectable airman devastated a rudder with a hacksaw, and finally flung the whole outfit over the side as one might an unwanted kitten.

"All right," said the W.O. "That will do. Go and get your dinners."

Obediently the men trooped away, once again meekly submissive to authority. In an hour's time they would be meekly attending their duties, meekly carrying out the safeguarding inspections, meekly following the regulations; entirely oblivious that the brutal instincts for destruction had been served, and their systems were the better for it. One can imagine them, possibly years afterwards, looking back with relish to the time when they did what they really wanted to do to an aeroplane. The very best servants preserve the instinct of rebellion against mastership, and if this outlet is given vent they are the better for it. . . . One can only explain the vigour of Service football in this way.

Thank you, "Lootenant." I am sorry you had a ducking, but you've done a power of good to six members of H.M. Aircraft Carrier *Spurious*.

SERVICES RUGBY TOURNAMENT

Army, 29 Points : Air Force, 9 Points

CONSIDERING that the Air Force Rugby XV had to take the field at Twickenham last Saturday (April 3) without F/O. Pratt, P/O. Malcolmson (both internationals), F/O. G. A. Walker, and with no Beamish at all, while the Army fielded a XV with seven internationals, it is hardly surprising that the Army won a decisive victory. Their score was complicated. They got four placed goals off tries, one penalty goal, one goal from a mark, and one try. The Air Force scored three tries and have reason to feel highly pleased with themselves for doing so much.

All through the first half of the game it would be hard to overpraise the R.A.F. forwards. They got the ball in nearly every scrum and shoved the Army pack right back without any mistake. This gave the Air Force outsides plenty of chances, but, even more important, it starved the dangerous Army runners. From a very early stage it became clear that the Air Force three-quarter line was inferior in speed to their opponents, and also lacked penetrating power. At the same time it was obvious that the airmen's tackling would need to be deadly if the Army three-quarters were to be kept out. Plenty of energy was shown by the R.A.F. men in this tackling business; often they got their men round the neck, and often by the ankle; rarely did one see the deadly tackle round the waist which puts a stop to all nonsense. Let us once again quote the triolet in which H. B. Tristram, the great Oxford and England full back of the middle eighties, told full backs :—

"If only you'll go
With a rush for his middle,
You'll tackle him low.
If only you'll go,
Never mind if you're slow;
For the runner you'll diddle
If only you'll go
With a rush for his middle."

All outsides may well take this to heart.

To return to the forwards. Not only did they scrummage well all the first half, but they were fast and dashing in the open, and put in some glorious dribbling rushes. The second try, touched down by Sergt. Fox, was entirely the result of one of these irresistible rushes. If in the second half the Army forwards wore them down and got the ball out more often than not, at least the Air Force forwards come out of the match with high honours. A/C. Holland and Sergt. Gascoigne did great work in the loose. The R.A.F. half backs were both good and bad. P/O. Spencer's passes from the scrum were so erratic that P/O. Moseby could rarely start an aggressive movement from them, and the whole attack was therefore stifled at birth. But both the halves ran well and it was Moseby who made possible P/O. Halford's try, which opened the scoring. Sergt. E. I. Parsons played a thoroughly sound game at full back, and the Air Force hardly suffered from the absence of F/O. Pratt.

It would be depressing rather than instructive to tell the story of the game in detail. After twenty-four minutes' play the Air Force got a try. Then the Army scored two full goals, but just before half time the Air Force forwards got a second try, and the teams crossed over with the Army leading by two place kicks. The place kicking of Lce./Sergt. Owen of the Welch Regiment was one of the brightest features of the game. His kicks scored 14 points.

In the second half the Army backs got plenty of the ball and their score began to mount as if Don Bradman were at the wicket. Lieut. Reynolds, recently capped as fly-half for England, and Lieut. Leyland were chiefly responsible, and their running was altogether too much for the Air Force defence. They went through pretty well as they liked. Variety was lent to the proceedings by Sergt. Owen kicking a penalty goal and then a goal from a mark. But it does great credit to the Air Force that when things looked very black a quarter of an hour before the end, P/O. Rogers made a really good run which resulted in a try by Gascoigne. Cpl. Sheppard's good kick hit an upright. Well, well, let's hope for better luck next year.

F. A. DE V. R.

Teams :—

Army.—Cadet S. I. Howard Jones; Lt. E. R. M. Bowerman, Lt. H. P. Glass, Lt. R. Leyland, Lt. J. H. Marriott; Lt. F. J. Reynolds, Lt. G. J. Dean (Capt.); Lt. W. M. Mylis, L./Sgt. C. R. Owen, Sgt. A. T. Boast, Lt. H. J. Sayers, Lt. C. L. Melville, Lt. J. H. H. Whitty, Lt. G. Taylor, Lt. J. H. Bowman.

Royal Air Force.—Sgt. E. I. Parsons (Dishforth); P/O. P. J. Halford (Odiham), P/O. A. V. Rogers (Upper Heyford), Flt. Lt. K. B. B. Cross (Capt.) (Duxford), F/O. J. M. Thompson (North Weald); P/O. W. G. Moseby (Abingdon), P/O. R. H. Spencer (Upper Heyford); P/O. H. O. Jones (Lee), Sgt. L. Fox (Felixstowe), F/O. R. H. Waterhouse (Lee), Corp. C. W. Sheppard (Granthan), P/O. J. A. Roncoroni (Upper Heyford), Sgt. W. F. Gascoigne (Upper Heyford), F/O. P. S. Hutchinson (Uxbridge), A/C.1 J. Holland (Hendon).

THE MANX AIR RACES

AS already foreshadowed, there have been several modifications in the Isle of Man Air Race arrangements for this year, and the whole affair is being carried out on really big lines with ample prize money. The most important departure has been the introduction of the Tynwald Race, for machines with engines not exceeding 60 h.p., which will be flown on the same day and over the same course as the Manx Air Derby, i.e., Monday, May 31. For this race the winner will receive £50, and the runner-up £20; in order to encourage the entries of these small machines there will be an arrival prize of £10 for the pilot who reaches Ronaldsway at a moment nearest to the sealed time between 4 and 4.30 p.m. on the previous Saturday.

In addition to the very worthwhile prize money for the three races, amounting to some £500 and donated by Mr. J. M. Cubbon, Germ Lubricants have offered a trophy for the race from London, and the June Effort Committee are also giving a cup to the winner of the Manx Air Derby.

The course for the long-distance race will be the same as that used last year—Hanworth, Speke, St. Bee's Head, Maughold Head and Ronaldsway—while that for the Manx and Tynwald Races will be three laps of the Island starting from Ronaldsway. During the period of the big race the Channel will be patrolled by a Naval vessel and by the Douglas and Ramsey lifeboats. For the moment it is not quite definite that the stop in the long race will be made at Speke, but this is extremely probable. All three races will, of course, be run on a handicap basis, with Messrs. Rowarth and Dancy officiating. Once again Capt. R. H. Stocken, of 3, St. James's Square, London, S.W.1, is the organising manager.

HERE and THERE

An R.Ae.S. Lecture by Mr. H. E. Wimperis : The New Zeppelin's Power Units : Frenchmen's Record Flight with British Machine

MR. T. G. JOHN, chairman and managing director of the Alvis Company, which he founded in 1919 and whose aero engine organisation is described in this issue. During the war he was works engineer of the Siddeley-Deasy Company, which, it may be remembered, manufactured many of our aero engines. Mr. John was at one time an officer of the Admiralty, and at another period was in charge of Vickers' technical and experimental departments.

The R.Ae.S. Presidential Address

ON Monday, April 26, the president of the R.Ae.S., Mr. H. E. Wimperis, C.B., C.B.E., M.A., M.I.E.E., F.R.Ae.S., will deliver his presidential address. The main part of the address will be concerned with a statement of the problem of human flight as related to the laws of nature, to which, like all else, it has to conform. One of the aspects of this problem is the relationship of those laws to the construction and performance of the aeroplane and its engine, the other is the physiological factors which limit the endurance of the human body, whether that of the pilot or his passengers. The president will endeavour to forecast in the light of present knowledge the limits thus imposed in respect of human flight.

The lecture will be followed by two films, one showing the humming bird in flight and the other the pelican, both at natural speed and in slow motion. The humming bird film, which was first shown at the Conversazione, is being shown again by special request. The pelican film will be shown for the first time to members at the meeting.

An important announcement regarding the Society's financial position will be made by the president at this meeting, which will be held at 8 p.m. in the lecture hall of the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2.

Centric Superchargers

APPLICATION of Centric superchargers to certain types of aero engines is being developed, and Mr. J. Hartley-Taylor has been appointed sales director of Centric Superchargers, Ltd., Bow Lane, Preston, Lancs.

The R.Ae.C. and Events Abroad

THE Royal Aero Club has received from the German Aero Club a limited number of invitations to British private owners to attend the international meeting to be held at Düsseldorf on May 7-10 to commemorate the opening of the exhibition there.

The Noord Nederlandsche Aero Club invites British private owners to its aerobatic meeting to be held at Eelde, near Groningen, on May 15-17.

Full particulars of both events may be obtained from the Royal Aero Club.

* * *

The Royal Aero Club receives full particulars of all aviation meetings abroad, and will be pleased to forward copies to all British private owners who will register their address for the receipt of such notices.

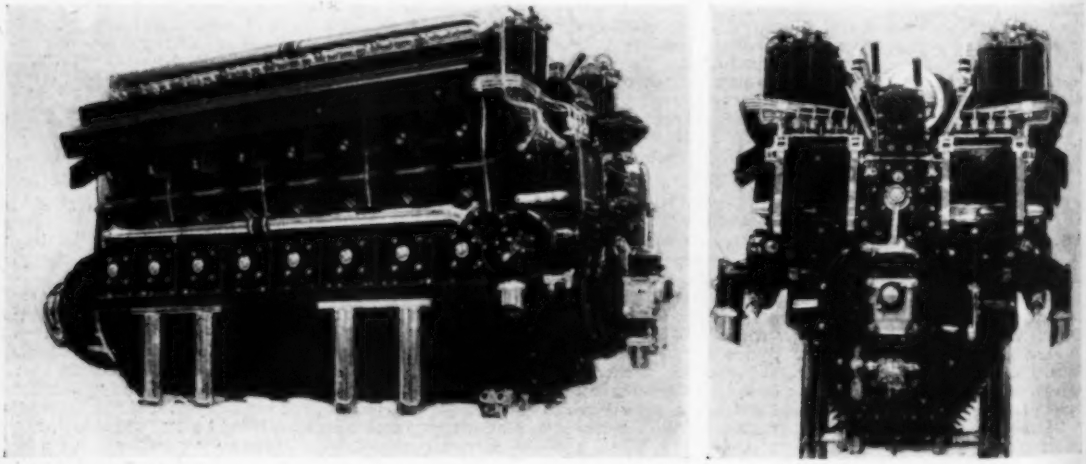
Steel Progress

AT the recent annual general meeting of Thos. Firth and John Brown, Ltd., the chairman, Lord Aberconway, revealed that during the past four years the company had spent over £1,000,000 in augmenting and modernising its plant. Of this, £390,000 had been spent in the past year. Although the company's steel-melting plant was believed to be the biggest in Europe, another high-frequency furnace was being added.

A New Protective Paint

AMONG the claims made for a new protective paint for metal surfaces is that the compound can not only be applied direct to an already rusted surface without preliminary cleaning off, but that it actually reacts on the rust itself in such a way as to transform it into an essential part of the protective coating. It is a paint with a basis of chlorinated rubber which is known for its powers of resistance to acids, alkalis, and mechanical damage, due to its extremely fine grain and high adhesive qualities.

The paint, which is being sold by Thos. Parsons and Sons, Ltd., Oxford Street, London, W.1, under the name of "Rust-Eeter," may be sprayed as well as applied by brush, is stated to set to the touch in less than twenty minutes, and to dry completely within twenty-four hours. A gallon will cover 400 to 500 square feet.

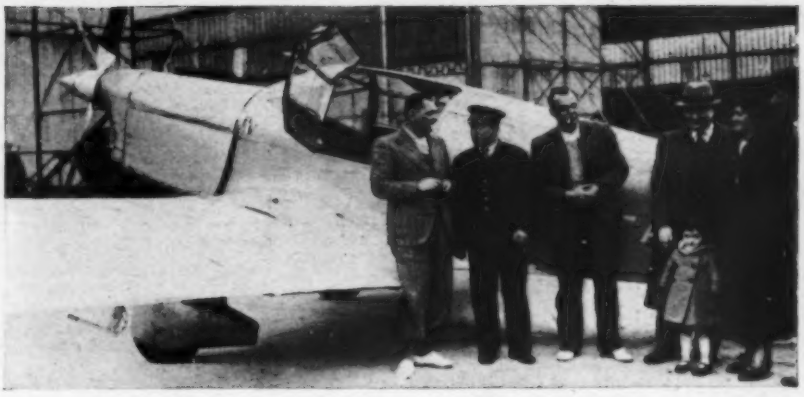


POWER FOR THE L.Z.130 : Two striking views of one of the 900-1,200 h.p. Mercedes-Benz diesel engines for the new Zeppelin. A sixteen-cylinder vee, the engine weighs 2,000 kg. (4,400 lb.)

SAIGON-PARIS RECORD BY VEGA GULL

THE two Frenchmen, MM. Pissavy and Cornet, who met with misfortune on their recent attempt to fly from Paris to Tokyo in 100 hours, have made a triumphant return flight from French Indo-China to Paris, breaking the previous record of 133 hours set up by Mlle. Maryse Hilsz in May, 1933.

Pissavy and Cornet arrived at Le Bourget at 5.27 last Sunday afternoon (French summer time; 4.27 p.m. G.M.T.), having made the trip of 7,350 miles in 3 days 22 hours 57 minutes. Their machine was a Percival Vega Gull, essentially standard, mounting a Series II de Havilland Gipsy Six engine which drove an electrically operated Ratier variable-pitch airscrew.



Mm. Pissavy and Cornet with their Vega Gull at Le Bourget last Sunday on their arrival from French Indo-China in record time.

Clothing Lockers

LOCKERS for office and works' staff use form the subject of the latest catalogue issued by Constructors, Ltd., Tyburn Road, Erdington, Birmingham, who are specialists in steel office furniture and works equipment.

Practical Welding Information

THE British Oxygen Co., Ltd., of Thames House, Millbank, Westminster, London, S.W.1, have published the first of a new series of technical information booklets. It deals with "rightward" (or backward) and "leftward" (or forward) methods of welding in great detail, the various points being fully illustrated.

R. B. Pullin Extend

FOLLOWING a successful appeal to the Brentford and Chiswick Town Council, R. B. Pullin and Co., Ltd., are to make a further extension to their Great West Road factory.

The company, which recently made a public share issue, specialise in instruments, particuarly of the gyroscope variety, including the Pullin turn indicator and automatic pilots.

Aero Alloys

MONEL-METAL specialists, Henry Wiggin and Co., Ltd., have published their first booklet wholly devoted to their products for the aircraft industry. It includes descriptions of the properties and uses of Monel metal for valve inserts and other aero engine parts, for fuel tanks and for rivets; of "K" Monel, which is magnetic, responsive to thermal hardening and is corrosion resisting; and finally of Inconel for exhaust manifolds. The booklet may be obtained from the company at Thames House, Millbank, London, S.W.1.

A B.S.I. Publication

A REVISED edition of B.S. Specification T.51 for High Pressure Seamless Copper Tubes for Aircraft Work has been issued by the British Standards Institution.

The principal revision consists in a modification to the method for testing the bores of the tubes. Hitherto the bore of each tube ¼in. outside diameter and over was required to be examined visually, the smaller tubes being tested by passing air through them at low pressure. The bores of all tubes have now to permit of a brass bob, a wire with a brass bob attached, or a wire to pass through freely. The bob or wire have to be 80 per cent. of the nominal bore and the length of the bob must be not less than twice its diameter.

The internal hydraulic test pressure for tubes over ¼in. outside diameter has been reduced from 6,000lb. per sq. in. to 4,000lb. per sq. in.

Copies of this specification may be obtained on application to the British Standards Institution, Publications Department, 28, Victoria Street, London, S.W.1, price 1s. 2d., post free.

Valve Steels and Machining

KAYSER ELLISON AND CO., LTD., have issued an instructive little booklet dealing with their valve steels. The various specifications are mentioned separately, with careful instructions as to their turning, shaping, milling, drilling, etc.

Magnesium Prospects

THAT the steadily increasing demand for aluminium as a result of expansion in the aircraft industy was one of the factors contributing to the progress of the British Aluminium Co. was mentioned at the annual general meeting held recently in London.

The chairman also said that for some years they had been studying the possibilities of the production of magnesium, and they were one of the founders of The Imperial Magnesium Corporation, which was now owned by them in association with the Imperial Smelting Corporation, and they were proceeding with the erection of a plant for producing magnesium in this country.

The Duchess of Bedford

STRUTS washed up at four points on the Norfolk and Suffolk coast last Friday were identified by Flt. Lt. R. C. Preston as unquestionably belonging to the Moth in which the Duchess of Bedford disappeared eleven days previously. Flt. Lt. Preston is quoted as saying he thought that the machine may have descended into the Wash, though it was also possible that it might have been flying over the sea north of Cromer.

Further evidence was found on Sunday, in the shape of a badly smashed airscrew boss washed up at Winterton, Norfolk.

At the memorial service, held on Wednesday of last week at Milton Abbot, Devonshire, the Rev. C. R. Bull said in his address: "The Duchess was a great leader and in many ways a pioneer. It is a tragic end to a life of great usefulness and influence for good, yet one wonders if she would have had if otherwise. One feels the thought of a long, wearying illness and decline would have been abhorrent to her. She must long ago have lost all fear of death in the air and when, at last, probably through a snowstorm, the call came she was ready for it."

Mr. R. J. SMITH, formerly Sales Manager of the National Benzole Co., Ltd., who has been appointed to the position of assistant general manager of the company. Mr. Smith has always been a keen supporter of aviation and can usually be seen at the more important meetings.

Topics of the Day

Going Abroad

A YEAR or two ago, when everyone appeared to be howling for derestriction in the matter of airworthiness certificates for ultra-lights, the howlers seemed to have forgotten just one thing.

Without a C. of A. it is not possible to take a machine abroad. Now, for the first fifty hours or so with a personally owned machine a pilot will probably be quite happy to fly around his home aerodrome or to make little trips to other aerodromes. Eventually, however—if the machine turns out to be anything more than a somewhat unreliable toy—the owner will start to examine the possibility of going abroad for the week-end or even for a protracted holiday.

Subject to the never-to-be-foreshadowed whims of politicians, whether dictatorial or otherwise, and to the non-stop range and reliability of one's machine, the pilot knows no barriers. One country looks very like another, and flying over water (provided that there isn't too much of it) is exactly the same as flying over land. Consequently, one might just as well fly to Berck or Brussels as to Birmingham or Brighton. Anyone with a bicycle or car can make his way to Brighton—*and* stay after lighting-up time—but there is something of a performance about making one's way to Brussels by surface transport. Consequently, the aeroplane is only really useful for cutting off corners, for hopping across ditches, and for going reasonably quickly without risking damage to one's nervous system.

If an owner's flying activities are restricted to fine-weather travel between Heston and Southend, then his aeroplane is really not doing its job. It is surely bad enough that dozens of perfectly good aeroplanes should be left, because of the English weather, in their hangars for three or four months in the year. When we *do* use aeroplanes we expect to be able to use them properly and to make up for all their enforced bad-weather uselessness by covering more ground in six months than would be possible in twelve by more normal means of transport.

Viceless

ONCE again—and for what it is worth—I must state my opinion about one aspect of the ideal flying characteristics of a really useful ultra-lightweight.

For very good reasons it should have a viceless stall. A sloppy turn with too much bottom rudder should produce nothing worse than a diving turn, and a straight stall, carried out sharply, should cause only a momentary drop of the nose. A gentle stall, bringing the stick right back, should leave the machine wallowing and losing height on a level keel.

These, of course, are characteristics which should be possessed by every machine except those in which everything has been sacrificed either for speed or for some other "competition" feature. They are particularly necessary in any machine with a small reserve of power and which flies so comparatively slowly that aileron drag is out of all proportion to aileron lift. With a very clean ultra-lightweight the need is not, perhaps, so great, since speed is necessarily conserved to a greater extent.

While the experienced pilot realises that liberties must not be taken with a 30 h.p. engine, the more dashing novice may feel perfectly safe until a badly executed steep turn leaves him suddenly with no speed in hand. He may then be trying to keep the nose up with his elevators, or, worse still, may try to get the nose down with full rudder. Result: A perfectly good spin.

And I may say that very few ultra-lights have ever been spun, for the simple reason that there is precious little room for a parachute, and without one the test pilot does not care to risk the possible consequences of such an evolution in an untried type. Furthermore, it is a Sabbath Day's journey up to the sort of height at which a parachute *could* be used.

I've only spun one of the little fellows—and half a turn was quite enough for me. How was I to know whether this particular machine's spin would go flat after a full revolution? I knew it was strong, and I had seen it looped, otherwise I would not have dared to attempt even a very small piece of autorotation.

But let us not get excited about this particular test. It is doubtful if any big transport has ever been spun; imagine Mr. Parker test-spinning a Short boat! A spin should not be possible on any machine, and I only practise them on occasion because machines are not perfect and I want my reactions to remain absolutely reflex—just in case. Though I quite like them, those who don't are in very good company.

Dead-Stick Practice

VERY few pilots of the new generation have ever had to pull off a forced landing with a good motor, except, perhaps, because of weather or shortage of fuel.

Nevertheless, they are still taught, but I wonder whether the average amateur understands the difference between a tick-over approach and one with a genuinely dead stick. The glide is much steeper, the stall is much more sudden, and the silence (with the black airscrew blade across the horizon) is somewhat nerve-shaking. My only forced landings have been into aerodromes either with half an engine or from the odd five hundred feet after accidentally stopping a cold engine, but I once stopped a Pobjoy engine in a Swallow—knowing that I had a string-starter to pull—and the effect was very educative.

Only one school, so far as I know, teaches real dead-stick landings, and that is Air Service Training. One cannot but admire the instructors! INDICATOR.

FROM the CLUBS and SCHOOLS

MIDLAND

FLYING times for the week ended April 2 were 13 hr. 25 min. dual, and 3 hr. 50 min. solo. A new flying member who joined the Club during the week was Wing Cdr. Wright.

SOUTH COAST

Better weather has enabled the Club to do over 40 hours' flying during the week, which is an improvement on last week's figure. A dance (informal dress) is being held at the clubhouse next Saturday (April 10) at 8 p.m.

SOUTHEND

The flying times for the last two weeks make a good record for an excellent month. The fine weather during the Easter brought crowds for pleasure flights. Visitors during the week included members from Bekesbourne, Lympne and Broxbourne.

YORKSHIRE

Members of the Yorkshire Aeroplane Club flew 34 hr. 20 min. last week, and made trips to and from Newcastle and Torquay. Mr. S. F. Preston, a former member, has rejoined as a country member and Mr. M. A. Messenger as an associate member.

WITNEY AND OXFORD

For the week ended April 3 flying times totalled seventeen hours, seven of which represented solo flying. Mr. P. W. M. Mallorie has gone solo, while Miss M. Connolly, Mr. H. G. Paul and Mr. B. S. Bakhtiar have joined as members. Flying times for March aggregated forty-five hours.

REDHILL

During March Club machines flew 255 hr. 20 min., while the flying for the fortnight ended April 2 amounted to 133 hr. 55 min. Messrs. Grant and Shearman have passed their "A" licence tests, while Mr. Brookes has made his first solo. Cross-country flights included trips to Amsterdam and Jersey.

CAMBRIDGE

Flying times at Marshalls' Flying School for the week ended April 4 totalled 57 hr. 30 min. Mr. Wallis has gone solo, and Mr. Browne has qualified for his "A" licence. Cross-countries were flown to Sywell and Croydon. One of the School Moths was flown to Paris for a few days by a member.

YAPTON

Flying times for the month of March totalled 114 hr. 55 min., and for April, to the 3rd, 7 hr. 45 min. New members are Messrs. R. N. Roy, L. D. Goldschmidt and W. Van Leer. Mr. D. F. Holland has passed his general and blind-flying tests for his "B," Mr. Gilbert Lancaster has passed the tests for his "A," and Mr. David Archer has made his first solo.

NORFOLK AND NORWICH

In spite of the fact that the Club was closed for two days last week for staff holidays, over twenty-five hours were recorded by members. Visitors during the week included Mr. A. Harris, who brought down a D.H. Dragon for Air Commerce, of Croydon; Mr. B. M. Dowson, in a Hornet, from the Nottingham Aero Club; and Mr. Giles Guthrie, in a Tiger Moth, from the Ipswich Aero Club.

HERTS AND ESSEX

With the more settled weather during the latter period of March flying hours increased and the total for the month was 236 hr. 42 min. During the past fortnight 139 hr. 25 min. were logged. Messrs. A. C. Ferguson, L. A. Fieldhouse and R. H. Turner have gone solo, and two new flying members—Messrs. E. J. Kain and W. A. Roberts—were enrolled. The Social Committee are organising a Carnival Dance in the clubhouse for Thursday, April 15.

BROOKLANDS

Members flew seventy-seven hours during last week. On Wednesday week Mr. L. Cliff left for Rome in a Leopard Moth with Mr. Cain as passenger; they returned on Sunday evening. New members are Messrs. Vandenbergh, Tollemache, Liverton and Smith, the latter two coming from New Zealand. The chief attraction of the week-end was a demonstration of the Hillson Praga monoplane by Miss Jennie Broad. After she had put the machine through its paces, numerous members took the opportunity offered of going up with her in the machine.

HANWORTH

The total flying hours for last month were 84 hr. 35 min. Messrs. D. A. Woolfe (National League of Airmen), A. Halls, R. B. Lord and Duncan have gone solo; Mr. J. Stone has passed his "A" licence tests; and new members are Messrs. A. H. Swann, Prytherch, J. Barber, K. Dane and P. Rooney. On Saturday Hanworth was visited by the Secretary of State for Air, Lord Swinton, who inspected the recently opened Volunteer Reserve School. H.R.H. Infante Alfonse of Spain has made his first solo flight since taking instruction at the Club.

A further Gipsy Moth has been acquired and this will shortly be available for use. This brings the number of Club machines up to a total of twelve.

DONCASTER

Club machines put in 26 hr. 10 min. flying for the week ended March 31. A "scavenger hunt" was held on March 21, and proved very successful. There is one new member—Mr. R. O. Lindesay.

LIVERPOOL

Weather conditions during the early part of March were very bad at Hooton, but during the fine spells all Club machines were in the air. The total time for the month amounted to 186 hr. 55 min., this figure being slightly lower than the corresponding period of last year.

KENT

Seventy-three hours were flown at Bekesbourne during March. Messrs. Atkins and Miller have joined the Kent Club as flying members, and Messrs. Gaylard and Truscott have passed the "A" tests. Mr. Truscott, incidentally, won the second prize in the Scholarship Scheme last year. Mr. Rogers has made his first solo.

LANCASHIRE

Weather has been kinder lately and flying hours are on the increase. The Club fleet is very much depleted owing to the fact that two Cadets are away for C. of A. and engine overhaul. The first Dawn Patrol will shortly take place and many "attackers" have signified their intention of being present for breakfast.

LONDON

The flying time for the last fortnight—with the Easter "recess"—was 159 hr. 15 min. Messrs. A. A. Walford, R. Sandeman and D. N. Kendall have completed the tests for their "A" licences, while Mr. C. D. Strickland has gone solo. Mr. L. Blow made a night flight to Southampton, and new members are Mrs. Robertson, Miss M. Maconn, and Messrs. D. Cowan, J. P. Smith, W. M. Aitken, A. Hopkins, J. Lidstone, J. R. Hatchett, J. R. Talbot, K. Smith, E. Liverton and Sqn. Ldr. Hardy.

CINQUE PORTS

New members joining the Club last week were Mrs. Harman, of Lympne, and Mr. John Grimston, of 601 Auxiliary Squadron. During the week Mr. J. Bamber successfully passed all the tests for his "B" licence, while Mr. Brand started out on his tests by completing the Cardiff flight. Mr. G. D. Jephson has obtained his "A" licence. Flying hours for last week were well up for the time of the year, the total being sixty-one. During the week the Club completed over six hours' co-operation night flying, the weather being more suitable than on previous occasions.

C.A.S.C.

During Easter Sunday and Easter Monday No. 4 Kent Squadron at Gravesend put in 7 hr. 5 min.

Sunday, April 4, marked the first "open" day of the Civil Aviation Service Corps at Fen Ditton aerodrome. Proceedings started at two o'clock with a landing competition, the prize for which, a silver cup, was won by Mr. S. A. Dew with 94 per cent. of the marks. This was followed by a bomb-dropping competition, won by Mr. R. A. Carter. Proceedings were further enlivened with paper-cutting and balloon-bursting by the chief instructor. Bad visibility prevented the cross-country competition from being held. Total flying times were 11 hr. 15 min.

PENANG

Members of the Penang Flying Club put in 149 h. 35 min. during February. The Club President, Mr. H. E. Nixon, has made his first solo, and Mr. W. G. Cooil, Mr. Liang Hsien Tse and Mr. Kam Thean Swee have passed the tests for the Straits Settlements "A" licences. The usual cross-country flights to Singapore, Kuala Lumpur, Ipoh, Alor Star and Taiping were undertaken by Club pilots. On February 21 the Club held its Annual Rally and Display, which was assisted by the whole-hearted co-operation of the Royal Air Force, Singapore, the Fleet Air Arm, the Straits Settlements Volunteer Air Force and the Malayan Flying Clubs. Forty-four aircraft visited Penang for the Rally, including every available civil aircraft in Malaya. There were nearly a thousand spectators in the Club enclosure, and several thousands more in the public enclosures.

YORKSHIRE GLIDING

Sport at Sutton Bank, Thirsk, was limited during the Yorkshire Gliding Club's Easter meeting by the adverse winds. For the most part activities were confined to circuits, but there was an informal spot landing competition, which was won by Mr. L. H. Barker. Several pilots spent the week-end at the Club while training for the International contests to be held at the Wasserkuppe, near Frankfurt, in July, when a British team will be sent over to compete. Trials of one of the three Kirbymoorside-built sailplanes, which will represent Britain in Germany, are expected to be staged at Sutton Bank in the near future.

On Monday, although there was only a slight breeze from the north-west, good flights were made. Mr. J. C. Neilan, holder of the British duration record, reached a height of 1,400 ft. in a thermal whilst flying a Hjordis sailplane. Another good performance was set up by Mr. P. A. Wills, holder of the British distance record, with a flight of over half-an-hour. Mr. H. Hastwell, flying a Grunau Baby, dropped below the level of the cliff, but managed to regain his height.

Private Flying

YORK AND LEEMING

During March the flying time at York and Leeming totalled 163 hr. 50 min. During the week ended April 2 Mr. Proctor obtained his "A" licence and Mr. Julian Rowntree and Mr. Fairbank have completed all their tests. Mr. Baretto has joined the staff as an instructor; he has just left the R.A.F. and was an instructor at Sealand. Club activities during last week have been numerous. Mr. William Hamble gave a party in the clubhouse and Mr. Alex Monteith and Mr. Julian Rowntree have given execellent colour film displays. Acceptances for the Club's International Meeting in June continue to come in.

LONDON GLIDING

During the first three months of this year 1,129 launches have been made by the London Gliding Club with a total of 178 hr. 49 min. flying time. The Club obtained permission to use Mr. A. S. Butler's private landing ground near Whipsnade for aero-towing on Sunday, March 21. Flying was impossible during the morning owing to low cloud, but during the afternoon twenty-one flights were made with a total of 3 hr. 30 min. All machines flew back to Dunstable at the end of the day. During the Easter period flying time totalled 38 hr. 40 min. Cross-country flights were made by J. S. Fox (to Hertford, 27 miles) and D. Hiscox (to Althome, 57 miles). The Imperial College Annual Camp started on April 1 and will run for a fortnight. The Club is organising monthly courses and camps between April and September. The next course will be held from May 14 to 23.

The Baynes Twin Flies

DURING last week-end the new Baynes Bee twin-engined monoplane made its first flight in the capable hands of Mr. Hubert Broad. From all accounts this first test showed that the machine was eminently satisfactory from the flying point of view.

Overhaul

A NEW company to deal with the overhaul, maintenance and special modification of airframes and engines has been formed with headquarters at Gravesend Airport, Kent. This is Essex Aero, Ltd., and the directors are Messrs. R. J. Cross and I. Teesdale.

A Price Change

OWING, it is explained, to the increase in the price of manufacturing materials, the price of the Miles Whitney Straight has been raised from £985 to £1,000. For the benefit of the majority of people, to whom the difference between a three-digit and four-digit figure always appears to be immense, it is pointed out that this increase is one of £15 only.

All The Owners

UNTIL recently it has only been possible for the earnest enquirer to discover aircraft owners' names and addresses by making a search through the registration cards, and since there are now some 700 owners this has been something more than a labour. Now, however, the Royal Aero Club has produced a list in alphabetical order which is obtainable, as explained in last week's issue, at a cost of 10s.

Such a list will naturally suffer changes from month to month, but it will be a simple matter to amend it.

This first list errs on the generous side. A number of names appear of people who have not owned machines for a matter of years, but every one of these must be classed as "prospective," and such a mistake is on the right side. One or two aeroplanes have, regrettably enough, been crashed since the list was prepared, and quite a few have changed hands. Such a list must obviously be considered as a foundation rather than as a finality.

Ground Training

THE Kronfeld vintage of flying training (1936) has just matured. The first and only taster so far is Mr. H. Rawnsley, of the County Flying Club, Leicester, who has made his first flights after ground training only. He started on the ground trainer, graduated to the secondary (flying) trainer, and finally flew the real Drone, on which he expects shortly to get his "A" licence. Eight other members are well on the way towards taking their first flights in the Drone.

The Club has acquired a new aerodrome at Rearsby with a maximum run of 1,000 yards, but while this is being prepared the training is being continued at Ratcliffe.

A Czech Invader

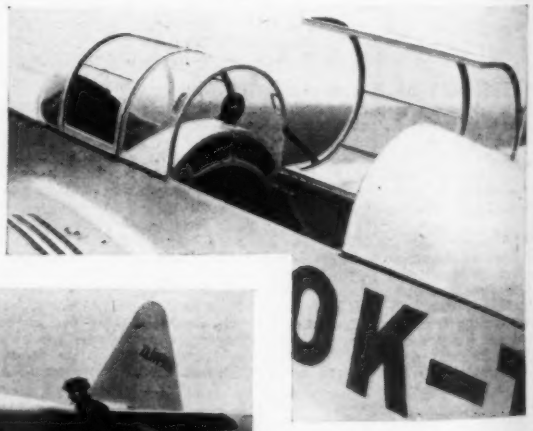
LAST week an interesting little light aeroplane from Czechoslovakia made its appearance at Heston. Known as the Zlin XII, it has been designed to a specification laid down by Mr. Bata himself, who is, of course, the well-known shoe magnate. The machine is a cantilever, low-wing, two-seater, tandem monoplane fitted with a 45 h.p. Persy II engine, and the price in this country will probably be about £350. In the country of its origin it is being sold at £250.

Of exceptionally clean design, it might be expected that the performance would be very good in spite of the comparatively low horse-power, and the maximum speed is, in fact, rather better than 95 m.p.h. Generally speaking, the structure is straightforward, with a two-spar plywood-covered wing, sharply tapering in plan form, and a ply-covered fuselage of square section. The Persy engine is of the flat-four type and resembles in its external features the well-known Continental unit.

Dual control is fitted, but the machine is normally flown from the back seat, where the usual instruments are to be found. Since the occupant of the front seat has a very much better view this is something of a disadvantage, but the machine would obviously be very unstable in the fore and aft plane if flown solo from the front. The two cockpits are completely enclosed under a single transparent cover, and curved sliding panels, which can be pushed completely open, are arranged for each occupant. It is interesting to see that the seats are arranged for the accommodation of back-type parachutes—items of equipment, which are taken more seriously on the Continent than they are here.

The specification and performance figures are as follows: span, 32.8ft.; length, 25.6ft.; all-up weight, 1,058lb.; disposable load, 421lb.; maximum speed, 96 m.p.h.; cruising speed, 84 m.p.h.; landing speed 37 m.p.h.; climb to 1,214ft. in three minutes; range 280 miles.

For the moment, any interested persons should get into touch with the Airwork Sales Department at Heston.



The Zlin XII and its accommodation. It will be noticed that the hinged covers for each cockpit carry large sliding panels, which when open should make the machine comfortably cool in hot weather. (*Flight* photographs.)

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

COMMAND OF A GROUP

The Air Ministry announces the appointment of Air Commodore John Hugh Samuel Tyssen, M.C., to be Senior Air Staff Officer and temporary Air Officer Commanding, No. 12 (Fighter) Group on April 1, 1937.

Air Comdre. Tyssen was seconded to the Royal Flying Corps, as a Flying Officer, from the Army in 1915. During the Great War he served in France and was awarded the Military Cross for conspicuous skill and gallantry. He was granted a permanent commission in the Royal Air Force, with the rank of Squadron Leader, in 1919, and in 1920 he was appointed to command No. 20 Squadron in India.

In 1924 Air Comdre. Tyssen was posted to No. 1 Group Headquarters for Air Staff Duties and while there he took a course at the Senior Officers' Army School, Sheerness. From April, 1930, to March, 1935, he commanded the R.A.F. Base at Gosport and, since the latter date, has been employed on Air Staff Training Duties and as Senior Air Staff Officer in Fighting Area Headquarters and latterly as Senior Air Staff Officer at No. 11 (Fighter) Group. He was promoted to Wing Commander in 1923, to Group Captain in 1931, and to his present rank in 1935.

APPOINTMENT OF PRIVATE SECRETARY

The Right Hon. Sir Philip A. G. D. Sassoon, Bart., G.B.E., C.M.G., M.P., Under-Secretary of State for Air, has appointed Mr. F. R. Howard to be his Private Secretary in succession to Mr. E. W. Short, with effect from March 25.

NEW SQUADRONS FORMED

No. 73 (Fighter) Squadron formed at Mildenhall on March 15, 1937, in the Fighter Command, in No. 11 (Fighter) Group. The unit will move later to North Weald.

No. 87 (Fighter) Squadron formed at Tangmere on March 15, 1937, in the Fighter Command, in No. 11 (Fighter) Group. The unit will move later to Martlesham Heath.

FORMATION OF EQUIPMENT DEPOT

No. 11 Equipment Depot opened at Chilmark, Wiltshire, on April 1, and has been placed in the Training Command in No. 24 (Training) Group, with effect from that date.

FAR EAST COMMAND

Headquarters, Far East Command, moved from Seletar to Singapore on April 1. All correspondence for this command should in future be addressed as shown below:—

The Air Officer Commanding, Royal Air Force, Far East, Union Building, Collyer Quay, Singapore, Straits Settlements.

NEW ZEALAND AIR FORCE

An important move by New Zealand to improve her air defences is announced, according to Reuter. The Air Force is separated from the Defence Department and receives new headquarters staff. At the same time, Wing Cdr. the Hon. R. A. Cochrane (R.A.F.), who is at present on loan to New Zealand from England, is appointed Chief of the Air Staff.

Other appointments announced are as follows:—Wing Cdr. Wilkes, Controller of Civil Aviation, becomes also Chief Staff Officer for equipment. Sqn. Ldr. Isitt becomes Chief Staff Officer for personnel.

GORDON SHEPHARD MEMORIAL PRIZE ESSAY

The awards in the 1936 competition for the Gordon Shephard Memorial Prizes are shown below. The competition is open to all members of the Royal Air Force for essays on reconnaissance and kindred subjects.

The Memorial Essay Prizes were established by Sir Horatio Hall Shephard, in memory of his son, the late Brigadier-General G. S. Shephard, D.S.O., M.C., R.A.F.

1st Prize.—Wing Cdr. G. S. N. Johnston, p.s.a., Headquarters, Bomber Command, Uxbridge.

2nd Prize.—Flt. Lt. W. A. Tattersall, No. 3 Equipment Depot, Milton, Berks.

3rd Prize.—Sgt. F. Gomersall, No. 32 (F) Squadron, Biggin Hill.

PROMOTIONS

The Air Ministry announces the following promotions with effect from April 1:—

General Duties Branch

Air Marshal to be Air Chief Marshal

Sir Cyril Louis Norton Newall, K.C.B., C.M.G., C.B.E., A.M.

Squadron Leaders to be Wing Commanders

Rowland John Divers, M.B.E., Percy John Barnett, M.C., Reginald Thomas Brooke Houghton, A.F.C., James Alexander Weatherhead Binnie, James Humphrey Butler, Cedric Waters Hill, Edward Irvine Bussell, Gerald Mornington Bryer, O.B.E., A.F.C., Charles Findlay, D.F.C., Leonard Graeme Maxton, A.F.C., Edward Thornton, Alfred Clifford Sanderson, D.F.C., Hugh Sydney Porter Walmsley, M.C., D.F.C., David Vaughan Carnegie, A.F.C., Charles Ronald Steele, D.F.C., John Whitworth Jones, George Oswald Venn, Edric William Broadberry, M.C., Cuthbert Joseph Stanley Dearlove, Anthony Lauderdale Paxton, D.F.C., Robert Hugh Hanmer, M.C., Sylvester Lindsay Quine, M.C., William Edward Theak, Frederick Lionel Benbow Hebbert, John Stanley Chick, M.C., A.F.C., William Elliot, D.F.C., Sydney Leo Gregory Pope, D.F.C., A.F.C., Louis William Jarvis, John Wakeling Baker, M.C., D.F.C., John Potter, Tom Oswald Clogstoun, James Huddart Dand, M.B.E., Guy Yelverton Tyrrell, M.C., Albert Frank Lang, M.B.E., A.F.C., Francis Henry Ernest Reeve, John Gustave Walser, M.C., Walter English Swann, Herbert Ivor Trentham Beardsworth, Alan Patrick Ritchie, A.F.C., George Edward Wilson, George Thomas Richardson, Charles Crawford, Paul Richard Tankerville James Michael Isidore Camille Chamberlayne, A.F.C., Henry Edward Walker, M.C., D.F.C., Jack Cottle, M.B.E., D.F.C., Francis John Williamson Mellersh, A.F.C., Aubrey Robert Maxwell Rickards, O.B.E., A.F.C., Robert St. Hill Clarke, A.F.C., Thomas Audley Langford-Sainsbury, D.F.C., A.F.C., Strang Graham, M.C., Aubrey Beauclerk Ellwood, D.S.C., Stuart Douglas Culley, D.S.O.

Flight Lieutenants to be Squadron Leaders

Thomas Stanley Horry, D.F.C., A.F.C., George Reginald Ashton, Maurice Michael Freehill, D.F.C., Frederick Korsten Damant, D.F.C., Harold Rice Bardon, William Alfred Tattersall, James Warburton, Henry Eustace Power, William Maxwell Cassilis Kennedy, John Hunter McNeill Campbell, John D'Arcy Keary, Henry William Pearson-Rogers, Cyril Kenneth Joseph Coggle, Geoffrey William Tuttle, Edward Blakeway Steedman, Frederick Cecil Rowland, Leslie William Cannon, Frank Maynard Denny, Theodore Neuman McEvoy, John Alfred Hawkings, John Harvey Hutchinson, Adrian Harry William James Cocks, Maxwell Charles William Craig Flint, M.C., Richard Kellett, Faulkner Michael Vane May, Alfred Charles Henry Sharp, Gilbert Bartholomew, Richard James Alexander Ford, Charles Francis Carey Coaker, Richard Llewellyn Roger Atcherley, Richard James Legg, Reginald Hawtrey Donkin, Harold John Granville Ellis Proud, Geoffrey Edwyn Gifford Lywood, Joseph Clarence Cross Slater, Thomas Philip Patrick Feltrim Fagan, Eric Edward Fallick, Richard Rupert Nash, John Rhys Jones, Thomas Francis Moloney, Allen Henry Wheeler, Anthony Caron Evans-Evans, Nevile Raby Buckle, Cedric Arnold Bell, Frederick Walter Hick Hall, Cyril Montague Heard, Robert Leslie Edward, Edward John George, Selwyn Harmer Cecil Gray, Ronald Christopher Wilson, John Francis Griffiths, Albert Edward Groom, M.B.E., D.S.M., William Gardner Campbell, Victor George Aidan Hatcher, A.F.C., Alexander Hutchinson Montgomery, M.B.E., Thomas Charles Dickens, John Beresford Martin Wallis, John Humphrey Edwardes Jones, Isaac John Fitch, Harold Frederic George Southey, Ellacott Lyne Stephens Ward, John Edward Wymer Bowles, Gerald Hamilton Loughnan, Leslie Clive Bennett, David Neal Roberts, Eric Bingham Webb, Patrick William Lowe-Holmes, Francis Victor Beamish, Douglas William Robert Ryley, George Herbert Huxham, Hubert Leonard Patch, Walter Hugh Merton, Alan Profeit Bett, Alfred Vavasour Hammond, Hugh Marcus Geoffrey Parker, Alexander Edward Taylor, Henry John Walker, Frederick George Hicks Ewens, Grenville Hammerton Shaw, John Norwood, Brian Courtenay Yarde, Howard Arthur Evans-Evans, Walter Graemes Cheshire, Eric Stanley Finch, John Sever Phillips, Joseph Herbert McCarthy Reynolds, John Nicholson Jaques (Lieutenant, R.A.F.O.), Walter George Woolliams, John Rene Whitley, A.F.C., Arthur Meuric Nairne David, Terence John Arbuthnot, Arthur Harold Owen, M.C., Edgard George Cleave Stokes, Leonard Rendell Stokes, Geoffrey Mungo Buxton, John Mary Joseph Charles James Ivan Rock de Besombes, Alexander Arthur Clarendon Hyde, Robert Daw-

las McEwan Hart, Arthur Edward Beilby, Frank Porter, William Henry Jinman, M.B.E., Thomas Henry Moon, John William Hutchins, Graham Nelson Coward, William Smith, Arthur John Brister, William Dickison, D.S.M., John Turner, John Willie Rose, Thomas Charlie Penna, Charles Snow, William Arthur Thompson, Herbert Little, John William White, Archibald Henry Harrison, D.S.M.

Equipment Branch

Flight Lieutenants to be Squadron Leaders

George Godfrey Caledon Pigott, Edward Alfred Burridge, Fitzgerald Charles Cecil Baron Hichens, John Henry Purcell Clarke, George Scarrott, Frank Henry Bedford, M.C., M.M., Osmond George Ridley, M.C.

ROYAL AIR FORCE GAZETTE

London Gazette, March 27, 1937

General Duties Branch

Flt. Lt. E. A. Douglas-Jones is granted a permanent commission in that rank (June 1, 1936); M. V. Blake is granted a permanent commission as Pilot Officer with effect from March 9 and with seniority of June 9, 1935.

The following are granted short service commissions as Acting Pilot Officers on probation with effect from and with seniority of March 8:—J. Adams, P. R. Austin-Sparks, V. H. Ayres, W. P. Bain, S. W. Baldie, P. R. Barr, H. B. Barton, W. S. Barton, W. R. Le H. Beatty, J. R. Bland, I. N. Bonard, C. E. Bowen, M. J. Brady, P. L. Burke, J. L. Calvert, J. A. Campbell, L. P. Cattell, R. D. C. Chambers, G. D. Clancy, J. S. M. Clarke, L. R. Cohen, D. N. Collins, H. D. H. Cooper, W. D. Corr, R. A. Couchman, A. H. C. Cox, J. R. Cruttwell, B. W. Currie, J. S. Davies, P. D. Dear, M. D. Donati, J. Dunn, F. G. Dutton, J. L. Ellis, G. L. Fraser, A. K. Furse, A. Gammie, D. C. Garton-Stone, G. C. Gauthier, H. G. Graham-Hogg, G. E. P. Green, W. P. Green, N. M. Harding, G. Harries, B. W. Hayward, J. T. Heath, J. Hobbs, A. R. Holmes, O. G. Horrigan, J. G. Howard, E. V. Hulbert, R. T. Hunn, P. F. Illingworth, R. H. Immelman, N. R. Irving, E. J. P. Jackson, N. Johnson, E. J. Kain, W. B. Keddy, T. H. Kilroy, P. F. King, E. H. W. Kirk, P. J. R. Kitchin, G. A. Lane, W. N. Lepine, E. W. Lockwood, A. M. G. Lywood, D. F. A. McBain, R. J. MacDonogh, L. H. McFarlane, A. McL. Mackinnon, B. D. F. Maclaren, D. D. McPetrie, G. A. McWhinney, G. K. H. Maitland, R. F. Marrack, J. P. Michell, J. C. Milner, A. S. Mirylees, P. L. B. Morgan, N. F. Morris, R. Moseby, H. G. Muller, J. D. W. Murray, J. H. Newberry, G. Packe, D. A. Peacock, J. A. Piddington, J. A. Pimlott, D. D. Pryde, D. W. Reacher, J. Read, A. F. Riddlesworth, H. M. Robertson, A. I. Robinson, S. J. D. Robinson, A. F. Russell, C. S. P. Russell, L. F. M. Saunders, R. Sawrey-Cookson, H. M. Selwyn, R. E. Smissen, R. E. Sperling, B. Statham, S. G. Stilling, D. A. Strachan, J. M. Strickland, J. A. D. Sturges, R. C. B. Swinden, A. C. Taylor, A. B. Thompson, D. L. Vercoe, J. H. Walker, J. H. Welford, J. W. G. Wellham, E. C. Wheelwright, D. F. J. Willis, P. A. Wimberley, E. W. Young.

R. H. Balls is granted a short service commission as Acting Pilot Officer on probation with effect from and with seniority of March 13.

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—C. P. Bomford, J. H. Coghlan, H. Henry-May, D. B. Hobson, E. J. S. Jones, J. S. Kendrick, P. D'A. Lister, P. H. R. R. Terry (February 3); E. E. M. Angell, J. A. Bateson, S. P. Crawley, L. F. Henstock, J. T. MacInnes, R. D. H. Maxwell, V. Mitchell, J. E. Scoular, P. J. S. Shaughnessy (February 10); J. W. B. Vernon (February 20); R. W. Gautrey (February 24).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. S. McLean, D. S. Radford (March 2); H. Stanton (March 9); A. F. Hamilton, F. W. Hilton, H. G. L. Allsop, G. J. Spence, E. B. King, J. W. Young, I. J. McGhie, A. T. H. Willis, H. L. Fry, H. S. Darley (March 15); K. D. Salmon (March 15).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—P. T. Philpott, C. D. Hackett, T. B. de la P. Beresford, J. H. Slater (January 27); W. I. Scott (February 24); C. E. R. Tait (March 2); H. M. Pinfold, G. B. M. Bell, G. D. Gargin (March 14).

Flt. Lt. C. F. Birks is transferred to the Reserve, Class A (March 14); Flt. Lt. G. Burdick is transferred to the Reserve, Class C (March 14); P/O. G. D. Evers resigns his short service commission (March 11). The short service commission of Acting Pilot Officer on probation N. V. B. Wilmshurst is terminated on cessation of duty (March 16); F/O. R. A. Charles-Auckland is dismissed the Service by sentence of General Court-martial (March 17); the notification in the *Gazette* of February 16 concerning Sqn. Ldr. D. d'H. Humphreys is cancelled.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

L. O. Atkins is granted a commission as Flying Officer in Class C with effect from and with seniority of March 9.

The following Pilot Officers on probation are confirmed in rank (March 8):—L. J. Dixon, H. A. Marsh, F. P. J. McGevor, D.F.M., H. A. Roxburgh, P. C. Ginn.

P/O. D. I. Peacock is promoted to the rank of Flying Officer (February 23); F/O. A. J. Stuart is transferred from Class AA to Class C (March 7); F/O. G. S. Hook relinquishes his commission on completion of service (March 14); F/O. D. M. Harrison resigns his commission (March 3).

AUXILIARY AIR FORCE

General Duties Branch

No. 500 (COUNTY OF KENT) (BOMBER) SQUADRON.—F/O. A. Andrew is promoted to the rank of Flight Lieutenant (February 7).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Vice-Marshal.—C. L. Courtney, C.B., C.B.E., D.S.O., to Headquarters, R.A.F., Iraq, Hinaidi; on appointment as Air Officer Commanding, 26.2.37.

Group Captain.—D. Iron, O.B.E., to No. 3 Flying Training School, Grantham; to command, 15.3.37.

Squadron Leaders.—A. King-Lewis, to No. 9 Flying Training School, Thornaby, for flying duties, 15.3.37. R. A. B. Stone, to Aircraft Depot, Iraq, Hinaidi; for Engineer duties, 4.3.37. A. W. B. McDonald, to No. 79 (Fighter) Squadron, Biggin Hill; to command, 22.3.37.

Flight Lieutenants.—R. V. McIntyre, to No. 73 (Fighter) Squadron, Mildenhall, 23.3.37. D. M. Lynch-Staunton, Communication Flight, Iraq, Hinaidi, 5.3.37. G. P. Marvin, to No. 51 (Bomber) Squadron, Driffield, 15.3.37. W. L. Freebody, to No. 114 (Bomber) Squadron, Wyton, 9.3.37. F. J. Taylor, to No. 139 (Bomber) Squadron, Wyton, 9.3.37. J. D. F. Bruce, to Directorate of Technical Development, Air Ministry, 15.3.37. H. R. L. Hood, to No. 5 Flying Training School, Sealand, 15.3.37. H. F. G. Southey, to No. 101 (Bomber) Squadron, Bicester, 15.3.37. I. McL. Cameron, to No. 44 (Bomber) Squadron, Wyton, 8.3.37.

Flying Officers.—C. F. Sarsby, to No. 103 (Bomber) Squadron, Usworth, 15.3.37. T. B. Morton, to No. 90 (Bomber) Squadron, Bicester, 15.3.37. P. S. Foss, to No. 142 (Bomber) Squadron, Andover, 20.3.37. M. Hallam, to No. 78 (Bomber) Squadron, Dishforth, 20.3.37. F. M. Loudon, to No. 61 (Bomber) Squadron, Hemswell, 20.3.37. S. S. Bertram, to No. 51 (Bomber) Squadron, Driffield, 15.3.37. J. H. Lowe, to No. 75 (Bomber) Squadron, Driffield, 15.3.37. L. H. Pomeroy, to No. 73 (Fighter) Squadron, Mildenhall, 15.3.37.

Pilot Officers.—N. G. C. Heath, J. E. Scoular, P. H. R. R. Terry, F. M. Thomas, J. R. I. Bell, D. Kain, and J. A. Thomson, to No. 73 (Fighter) Squadron, Mildenhall, 15.3.37; S. McC. Boal, J. H. Greswell, R. P. A. Harrison, H. A. A. Webster, D. E. Hughes, and N. B. Mole, to No. 217 (General Reconnaissance) Squadron, Boscombe Down, 15.3.37. G. L. Raphael, R. K. Wildey, to No. 78 (Bomber) Squadron, Dishforth, 20.3.37. V. E. R. Williams, to No. 30 (Bomber) Squadron, Dhibban, Iraq, 26.2.37. A. W. Lee, to No. 108 (Bomber) Squadron, Upper Heyford, 16.3.37. J. E. Baskerville, W. E. Casley, C. A. Wood, to No. 51 (Bomber) Squadron, Driffield, 15.3.37. D. M. Barrett, J. A. Crockett, E. C. S. Fentrell, E. A. Keegan, C. J. F. Kydd, A. S. K. Scarf, J. R. Sullivan, to No. 61 (Bomber) Squadron, Hamswell, 20.3.37. J. A. O'Neill, A. R. Pruddah, to No. 58 (Bomber) Squadron, Driffield, 15.3.37. C. J. K. Hutchins, K. T. Thompson, to No. 61 (Bomber) Squadron, Hemswell, 8.3.37. R. H. Niven, W. T. C. Seale, R. D. Speare, F. Holman, C. L. Olsson, G. I. L. Corder, to No. 75 (Bomber) Squadron, Driffield, 15.3.37. A. L. Bocking to No. 33 (Bomber) Squadron, Ismailia, Egypt, 1.3.37. G. C. N. Close, to No. 5 (Army Co-operation) Squadron, Chaklala, India, 16.3.37. G. W. C. Gleed, E. P. Mortimer, to No. 103 (Bomber) Squadron, Usworth, 15.3.37. H. I. Edwards, D. R. Biggs, S. Hook, G. L. B. Hull, A. F. M. Sisley, to No. 90 (Bomber) Squadron, Bicester, 15.3.37. L. Aitken, to No. 16 (Army Co-operation) Squadron, Old Sarum, 10.3.37. I. G. Morrison, E. G. Palmer, to No. 44 (Bomber) Squadron, Wyton, 8.3.37. M. V. Blake, to No. 5 Flying Training School, Sealand; on appointment to a permanent commission, 9.3.37.

Acting Pilot Officers.—C. L. Haddon, C. E. Harris, C. S. Kemp, to No. 90 (Bomber) Squadron, Bicester, 15.3.37. H. C. Sammels, J. W. H. Bray, D. I. Jobson, T. W. Lamb, T. D. M. MacDonald, A. N. MacFarlane, T. C. Weir, A. M. McKenzie, H. G. Marriott, to No. 44 (Bomber) Squadron, Wyton, 8.3.37. W. B. G. Bonser, H. Budden, C. D. Fox, to No. 51 (Bomber) Squadron, Driffield, 15.3.37. D. J. How, to No. 61 (Bomber) Squadron, Hemswell, 20.3.37. J. T. MacInnes, to No. 58 (Bomber) Squadron, Driffield, 15.3.37. H. L. McL. Bulloch, W. R. Gardiner, to No. 75 (Bomber) Squadron, Driffield, 15.3.37.

Equipment Branch

Flight Lieutenants.—J. W. Stokes, to "A" Equipment Depot, Hendon, 1.3.37. C. M. P. Hartley, to No. 4 (Army Co-operation) Squadron, Odiham, 17.3.37.

Accountant Branch

Flight Lieutenants.—J. R. Ackers, to No. 4 (Army Co-operation) Squadron, Odiham, 17.3.37. D. A. K. Yiend, to No. 4 Flying Training School, Abu Sueir, Egypt, 1.3.37.

Flying Officer.—R. F. Courtin, to R.A.F. Depot, Uxbridge, 24.3.37.

Medical Branch

Flight Lieutenant.—O. S. M. Williams, to Princess Mary's R.A.F. Hospital, Halton, 17.3.37.

AN ANGLICISED NEWCOMER

The German B.F.W. Messerschmitt Taifun to be Introduced to the British Market : Gipsy Six II Optional

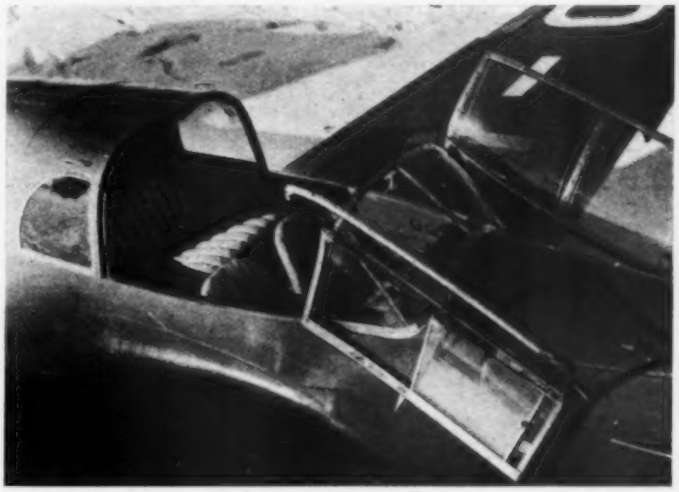
THE fact that the B.F.W. Messerschmitt Taifun (Typhoon) is to be handled in this country by A.F.N., Ltd., of Falcon Works, London Road, Isleworth, Middlesex, has already been recorded in *Flight*. This concern, the directors of which are Messrs. H. J. and D. A. Aldington, is responsible for the excellent Frazer Nash cars.

The Typhoon is a four-seater, low-wing, cantilever monoplane embodying Handley Page slots, flaps and a retractable undercarriage. Its speed range is from 45 m.p.h. to 187 m.p.h. (with the 240 h.p. Argus engine) and the machine is claimed to handle well throughout, notably at the lower end.

Stressed-skin construction is used for the wings, which have mass-balanced ailerons and flaps interconnected with the Handley Page slots, the slots and flaps being operated from the pilot's cockpit.

A monocoque stressed-skin structure, the fuselage is of fine aerodynamic form. The two front seats of the four provided can be adjusted horizontally, and all four have recesses for parachutes. Complete dual controls are fitted. The two large doors can be discarded bodily in case of emergency. Soundproofing is applied to the walls and floors.

The undercarriage is a laterally retracting cantilever type with oleo-spring shock absorbers and hydraulic brakes.



The cabin doors of the Typhoon can be removed bodily to form emergency exits.

In Germany the normal power plant is the 240 h.p. Argus As 10-C eight-cylinder, air-cooled, inverted vee, but an alternative installation, which should appeal to prospective purchasers in this country, is the Series II D.H. Gipsy Six, driving a de Havilland variable-pitch airscrew. The engine is fed from fuel tanks built into the wing roots.

The following data relate to the machine fitted with the 240 h.p. Argus: Span 34 ft. 7 in., length 27 ft. 3 in., height 7 ft. 7 in., wing area 177 sq. ft., weight (empty) 1,621 lb., gross weight 2,834 lb., wing loading 17.3 lb./sq. ft. Maximum and cruising speeds are, respectively, 187 and 162 m.p.h., and at a weight of 2,464 lb. the machine is claimed to land at 45 m.p.h. Fully laden it will climb to 10,000 ft. in 13.10 minutes. The service ceiling with four up and 112 lb. of luggage, etc., is 21,300 ft. Cruising at 156 m.p.h., a range of 620 miles is obtainable.

In this country the Typhoon will sell at £3,250.

Room to Expand

DUE to expansion of their business, Germ Lubricants, Ltd., have moved into more commodious premises in London. The new address is City Gate House, Finsbury Square, London, E.C.2 (Telephone, National 9001).

A Big Oil Contract

MANUFACTURERS of "Trogon" oils, Frank How and Co., Ltd., Trogon Wharf, of High Street, Stratford, London, E.15, state that they have been entrusted by the Air Ministry with the major portion of its contract for the lubrication of aircraft both at home and at overseas. This, they claim, is the largest oil contract ever placed with an individual firm.

Wellworthy Products at Brooklands

IT is announced that the Brooklands Engineering Co., Ltd., Brooklands Track, Weybridge, Surrey, have been appointed agents for all Wellworthy products.

All-round Approval

SUPERFLEXIT tubing, which was formerly approved for petrol and oil on all civil aircraft and for petrol only on Service aircraft, has now been authorised by the Air Ministry for use with hot oil up to 100 deg. Centigrade on all R.A.F. types. This means, it is stated, that Superflexit is the only non-metallic tubing approved for both petrol and oil on Service and civil aircraft. The makers are Superflexit, Ltd., of Slough, Bucks.

THE INDUSTRY

THE REFLECTION DEPARTMENT: One of the three polishing shops which are responsible for that mirror-like finish which characterises Bristol engine components. The shop seen above is equipped with forty 1,500 r.p.m. flexible-drive polishers to which different types of rotary files can also be fitted. Here are handled alloy forgings and castings such as crankcases, blower casings and p'stons. Note the individual dust-extracting trunks. Another shop with thirty 2,200 r.p.m. polishers deals with steel parts, while a third is devoted to the scruffing of cylinder heads and the decarbonisation of cylinders from the engine stripping shops.

Percivals at Luton

BOTH offices and works of Percival Aircraft, Ltd., have now been transferred to Luton Airport, Luton, Beds, whither correspondence, accounts, etc., should be addressed.

Welding Installations

IT may be recalled that in *Flight* of March 4 there appeared a description of the "Frama" welding plants. It should be made clear that C. H. Johnson and Sons, Ltd., Manchester, 8, are the concessionaires, and not the manufacturers.

Technical Developments

IT is announced that Mr. Saville Sneath, well known in aviation circles as general sales manager of Burgess Products Co., Ltd., has just resigned this post to become managing director of International Technical Developments, Ltd., whose headquarters are at Thames House, London.

The function of the latter concern is the development and marketing of new devices, processes and equipment, particularly in the electrical, chemical and acoustical fields. A special department is being established to handle several new and interesting developments in aircraft equipment, which Mr. Sneath, an amateur pilot himself, will personally direct. Among these developments is the Gaertner oxygen regulator, for which International Technical Developments hold the British and certain European concessions.

The company has as its research and technical consultant Dr. H. de Laszlo, the well-known scientist and metallurgist.

A New Air Route Beacon

A RECENT addition to the range of G.E.C. aerodrome lighting equipment is a 24 in. diameter rotating route beacon. This is a searchlight type of beacon employing a 24 in. optically worked parabolic reflector throwing a narrow-angle beam just over the horizontal plane and an auxiliary beam up to 25 deg. above the horizon. In addition, the beacon is mounted on trunnions so that the angle of the beam can be adjusted to suit local conditions.

It is driven by a ¼ h.p. motor, and the light source is a 1,500-watt Class A1 Osram projector lamp fitted with a prefocus cap, so that lamp replacements can be effected without the need for refocusing the optical system. A stand-by lamp is also provided, which automatically comes into operation in the event of the service lamp failing while the beacon is alight and at the same time a warning bell and lamp are actuated alongside the beacon to indicate to the maintenance staff that a lamp has failed. Beacons of this type are being supplied to the Australian Government.

PUBLICATIONS RECEIVED

The War Office: Report of the Air Survey Committee, No. 2-1935, price 4s. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

The Journal of the Royal Air Force College, Cranwell. Spring, 1937. Gale and Polden Ltd., Wellington Works, Aldershot.

The Air Annual of the British Empire, 1937. Founder and First Editor, Sqn. Ldr. C. G. Burge. Price 21s., Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

War on Great Cities, by Frank Morison. Price 8s. 6d., Faber and Faber, Ltd., 24, Russell Square, London, W.C.1.

Inspection of Aircraft After Overhaul ("B" Licence), by S. J. Norton. Price 3s. 6d., Sir Isaac Pitman and Sons, Ltd.

A Simple Study of Flight, by J. D. Haddon. Price 3s. 6d. Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

The Blue Book: The Electrical Trades Directory and Handbook, 1937. Price 25s., Benn Bros., Ltd., Bouverie House, Fleet Street, London, E.C.4.

Passenger by Air, by Richard Coke, price 10s. 6d., John Hamilton, Ltd., 32, Bloomsbury Street, London, W.C.1.

The Construction of Wooden Aircraft, by S. F. Wilkinson, price 10s. 6d., Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, W.C.2.

Brass Pressings and Other Copper Alloy Products. Free of charge no application. Copper Development Association, Thames House, Millbank, London, S.W.1.

The Conquest of the Stratosphere, by C. G. Philp, price 7s. 6d. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London, W.C.2.

Let's Learn to fly!, by C. St. John Sprigg, price 3s. 6d. Thomas Nelson and Sons Ltd., 35-36, Paternoster Row, London, E.C.4.

Flug nach England, by F. O. Busch. Price Mk. 1.95. J. F. Lehmanns Verlag, München, SW2, Germany.

Europe in Arms, by Liddell Hart. Price 12s. 6d. Faber and Faber, Ltd., 24, Russell Square, London, W.C.1.

National Advisory Committee for Aeronautics Reports: No. 562—Air Flow in the Boundary Layer near a Plate, by H. L. Dryden; price 10 cents. No. 568—The Quiescent-Chamber Type Compression-Ignition Engine, by H. H. Foster; 10 cents. No. 571—Pressure Distribution over a Rectangular Airfoil with a Partial-Span Split Flap, by C. J. Wenzinger and T. A. Harris; 10 cents. No. 572—Determination of the Characteristics of Tapered Wings, by R. F. Anderson; 10 cents. No. 573—Aerodynamic Characteristics of N.A.C.A. 23012 and 23021 Airfoils with 20 per cent. Chord External-Airfoil Flaps of N.A.C.A. 23012 Section, by R. C. Platt and I. H. Abbott; 10 cents. No. 574—Pressure Distribution over an Airfoil Section with a Flap and Tab, by C. J. Wenzinger; 10 cents. No. 578—Flight Measurements of the Dynamic Longitudinal Stability of Several Airplanes and a Correlation of the Measurements with Pilots' Observations of Handling Characteristics, by H. A. Soulé; 10 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Twenty-Second Annual Report of the National Advisory Committee for Aeronautics, 1936. Price 15 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Thermodynamics Applied to Heat Engines, by E. H. Lewitt (2nd edition). Price 12s. 6d. Sir Isaac Pitman and Sons, Ltd., Parker St., London, W.C.2.

Air Over Eden, by "H.W." and Sidney Hay. Price 18s. Hutchinson and Co. (Publishers) Ltd., 34, Paternoster Row, London, E.C.4.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(*Published April* 8, 1937).

16560. BACK, W. E.: Flying machines (462,382).

24138. MAYROW, J. J.: Construction of wings, aerofoils and the like, for aeronautical machines (462,390).

25130. MAYROW, J. J.: Construction of aircraft bodies, wings, and aerofoils (462,539).

25165. NONAKA, S.: Parachutes (462,670).

25166. NONAKA, S.: Parachutes (462,671).

25167. NONAKA, S.: Parachutes (462,722).

25372. SCOTT, B. D.: Multi-cylinder internal combustion engine units (462,686).

27321. POOL, J. H.: Parachutes (462,559).

29912. HISCOCKS, S. W., and HUGHES, H. A.: Gun mountings for aircraft (462,483).

35942. DUNLOP RUBBER CO., LTD., and WRIGHT, J.: Fluid-pressure devices for aircraft and other purposes (462,570).

1465. GES. FUR KREDITPRUFUNG GES., and SCHEIDING, M.: Controlling the output of internal-combustion engines of flying machines (462,411).

9295. FAIREY AVIATION CO., LTD., and YOUNGMAN, R. T.: Means for controlling aircraft (462,498).